Interreg Danube Region

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BrAIn

BrAIn Library

Activity 3.1: Creating knowledge hub – setting up the BrAIn LIBRARY

Reference No. DRP0200025

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Introduction

Artificial Intelligence (AI) is rapidly transforming economic sectors and public services across the Danube Region and Europe. While offering new opportunities for innovation, productivity, and competitiveness, AI also brings regulatory and practical challenges, especially for SMEs and public institutions. The BrAIn Project, under the Interreg Danube Programme, supports regional stakeholders in adopting responsible and sustainable AI solutions.

This E-Library is a key deliverable of the project, providing a clear and structured collection of relevant materials on AI trends, policies, research, and real-world applications. It brings together legislation, national strategies, research papers, case studies, and sector analyses to help users understand how AI is governed and implemented.

For ease of use, the documents are grouped into three categories: **AI Policy and Regulatory Framework**, **Research and Innovation**, and **Practical AI Applications**. This structure allows users to explore both strategic insights and practical examples.

The E-Library aims to support informed decision-making by offering easy access to high-quality resources on regulatory developments, national approaches, emerging technologies, and best practices. By consolidating diverse materials in one place, it helps bridge the gap between AI potential and practical implementation.

As AI continues to evolve, this E-Library will remain a valuable tool for knowledge sharing, capacity building, and collaborative learning, contributing to the BrAIn project's mission to promote responsible and effective AI adoption in the region.

CHAPTER I. AI Policy and Regulatory Framework

The AI Policy and Regulatory Framework category brings together essential documents that define how artificial intelligence is governed at European, national, and international levels. It includes the EU AI Act, national AI strategies, ethical guidelines, and position papers issued by public institutions, advisory bodies, and stakeholder organizations. These documents provide the legal and conceptual foundations shaping how AI systems are developed, deployed, and monitored across various sectors. By clarifying obligations, risk classifications, compliance requirements, and enforcement mechanisms, they enable policymakers, businesses, and innovators to operate within a predictable and trustworthy regulatory environment.

This category is essential because regulatory clarity is a primary driver for AI adoption. SMEs, start-ups, and public authorities need clear rules to plan investments, manage risks, and build confidence in emerging technologies. The selected materials identify key trends, such as the shift toward risk-based regulation, increasing demand for transparency and explainability of AI systems, and growing emphasis on human-centric and ethical principles. Furthermore, these documents highlight the importance of international collaboration, harmonization of standards, and alignment with broader digital policies (e.g., GDPR, Digital Services Act, Data Governance Act).

Together, the readings in this category offer a comprehensive view of how AI policies evolve, providing a stable foundation for informed decision-making. They reflect Europe's commitment to shaping AI in a way that balances innovation, safety, and societal values, ensuring that technological progress does not come at the expense of fundamental rights or democratic principles.

Title of the Paper:
Guidelines on the definition of an artificial intelligence system established by AI Act

Type of Document:
Guidelines/Policy

Authors / Institution:
European Commission

Year of Publication:
2025

Summary / Abstract:
This document provides detailed guidelines on the definition of an artificial intelligence (AI) system as established by Regulation (EU) 2024/1689 (AI Act). It clarifies the seven core elements that constitute an AI system—machine-based operation, autonomy, potential adaptiveness, system objectives, inferential capability, ability to generate impactful outputs, and interaction with physical or virtual environments. The guidelines aim to support providers, developers, and other relevant stakeholders in determining whether a system falls within the scope of the AI Act, thereby enabling consistent application and facilitating compliance.

The text further distinguishes AI systems from non-AI systems, highlighting important boundaries such as traditional software, basic data processing tools, heuristic algorithms, and systems used for mathematical optimisation. Emphasis is placed on flexibility to accommodate evolving technologies, while maintaining clarity in regulatory interpretation. Although non-binding, the guidelines reflect stakeholder consultations and contribute to the effective implementation of the AI Act by offering practical insights and examples relevant to diverse technological approaches.

Keywords: *AI Act; Artificial Intelligence System; Autonomy; Adaptiveness; Machine-based System; Inference; EU Regulation 2024/1689; Output Generation; Policy Guidelines; Scope Definition; Compliance; Stakeholder Guidance; Regulatory Framework.*

Link to Full Document:
https://ec.europa.eu/newsroom/dae/redirection/document/112455

Title of the Paper:
AI Act

Type of Document:
Guidelines/Policy

Authors / Institution:
European Commission

Year of Publication:
2025

Summary / Abstract:
This Regulation establishes a harmonised legal framework across the European Union for the development, placing on the market, putting into service and use of artificial intelligence (AI) systems, in line with the EU's internal market functioning and its values of human-centred, trustworthy and sustainable AI. It aims to prevent fragmentation of national rules, ensure legal clarity and support innovation, while safeguarding health, safety, fundamental rights, democracy, rule of law and environmental protection.

The text adopts a risk-based approach: it bans certain unacceptable AI practices, imposes stringent obligations on "high-risk" AI systems, and establishes transparency requirements for other types of AI systems. It also applies extra-territorially (in certain cases), supports innovation (for example via regulatory sandboxes), and complements existing laws (such as data protection, consumer and labour law) without replacing them.

Keywords: *Artificial Intelligence Act; AI regulation; risk-based approach; high-risk AI; transparency obligations; harmonised rules; EU internal market; fundamental rights; AI systems; trust-worthy AI; regulatory sandboxes; cross-border AI; EU values.*

Link to Full Document:
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401689

Title of the Paper:
EU Startup and Scaleup Strategy

Type of Document:
Strategy

Authors / Institution:
European Commission

Year of Publication:
2025

Summary / Abstract:
The EU Startup and Scaleup Strategy articulates the European Commission's ambition to make the EU the world's best place to launch, scale and grow technology-driven innovative companies. It identifies the need to close Europe's innovation gap with major global competitors by improving the regulatory, financial and business environment for startups and scaleups—so that founders, innovators and investors choose Europe rather than relocate elsewhere.

The strategy sets out a comprehensive set of legislative, policy and financing actions at both EU and Member State levels. Key focus areas include fostering innovation-friendly regulation, facilitating access to finance, accelerating market uptake and expansion, attracting and retaining talent, and providing access to infrastructure, networks and services. These actions aim to enable startups and scaleups to unlock their full potential for growth, jobs and competitiveness in the internal market.

Keywords: *startup ecosystem; scale-up; innovation policy; competitiveness; access to finance; regulatory framework; talent attraction; infrastructure; European Innovation Council; deep tech; single market; EU innovation gap.*

Link to Full Document:
https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/jobs-and-economy/eu-startup-and-scaleup-strategy_en

Title of the Paper:
Report on the implementation of the OECD recommendation on artificial intelligence

Type of Document:
Guidelines/Policy

Authors / Institution:
OECD

Year of Publication:
2025

Summary / Abstract:
This report provides a comprehensive overview of how member countries and adherents are implementing the 2019 OECD Recommendation on Artificial Intelligence (which sets out ten principles for trustworthy AI) and assesses whether the recommendation remains relevant and fit for purpose. It outlines the methodology used—centered on a questionnaire sent to adherents—and summarises how definitions, principles and frameworks have been applied in practice. The document first revisits the definitions and principles of trustworthy AI, then presents results from the implementation questionnaire, detailing opportunities and risks identified by adherents. It further addresses dissemination efforts by the OECD Secretariat and member countries, and concludes with reflections on implementation progress, limitations and ongoing relevance of the recommendation.

Keywords: *OECD; Artificial Intelligence; AI Governance; Trustworthy AI; AI Principles; Implementation Report; Policy Framework; Adherents; Questionnaire Findings; AI Risks and Opportunities; Harmonisation; International Cooperation.*

Link to Full Document:
https://one.oecd.org/document/C/MIN(2024)17/en/pdf

Title of the Paper:
Recommendation of the Council on Artificial Intelligence

Type of Document:
Guidelines/Policy

Authors / Institution:
OECD

Year of Publication:
2024

Summary / Abstract:
The Recommendation of the Council on Artificial Intelligence (OECD/LEGAL/0449) establishes a set of guiding principles for the trustworthy stewardship of AI systems and calls on Member countries to adopt coherent national policies and frameworks in line with those principles. The document, adopted on 22 May 2019, aims to foster innovation and economic growth while ensuring that AI deployment respects human-centred values, fairness, transparency, robustness, security, safety and accountability.

In addition to the principles, the Recommendation outlines measures for national policies and international cooperation, urging countries to invest in AI research and development, enhance human capital and skills, ensure the diffusion of AI systems in a responsible way, and develop the metrics and international mechanisms necessary to monitor progress.

Keywords: *AI governance; trustworthy AI; OECD AI Principles; inclusive growth; human-centred values; transparency; explainability; robustness; accountability; national AI policies; international cooperation*

Link to Full Document:
https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449

Title of the Paper:
The International Scientific Report on the Safety of Advanced AI

Type of Document:
Guidelines/Policy

Authors / Institution:
Multiple Contributors

Year of Publication:
2025

Summary / Abstract:

The International AI Safety Report is the first major comprehensive review of scientific research on the capabilities and risks of general-purpose AI systems, authored by over 100 independent experts and led by Turing Award winner Yoshua Bengio. It provides decision-makers with a shared global picture of how AI systems are advancing — particularly in mathematics, coding, and scientific domains — and what new risks (such as bio-weapons, cyber-attacks, and controllability issues) these pose. Backed by 30 countries and international organisations, the report is shaping global AI policy and governance.

Keywords: *AI safety, general-purpose AI, risks & capabilities, global collaboration, policy reference, controllability, cyber-threats, bio-security, international governance.*

Link to Full Document:
https://assets.publishing.service.gov.uk/media/679a0c48a77d250007d313ee/International_AI_Safety_Report_2025_accessible_f.pdf

Title of the Paper:
Strategia națională în domeniul inteligentei artificiale 2024-2027

Type of Document:
Guidelines/Policy

Authors / Institution:
Autoritatea pentru Digitalizarea Romaniei

Year of Publication:
2024

Summary / Abstract:
The SN-IA outlines Romania's strategic vision for the period 2024-2027 to adopt and use artificial intelligence (AI) in a way that fosters trusted, excellent, and human-centred AI to drive economic growth and social welfare. It sets out six general objectives — building skills and education in AI, developing infrastructure and data sets, strengthening research-innovation in AI, facilitating technology transfer, encouraging society-wide AI adoption, and establishing governance/regulation frameworks. The strategy emphasises alignment with EU and international standards, addresses challenges such as low digital skills, fragmented resources and regulatory gaps, and promotes cross-sector collaboration among academia, business and public administration.

Keywords: *AI strategy, Romania, digital transformation, competencies, infrastructure, data sets, research & innovation, technology transfer, adoption, governance, regulation, ethical AI, human-centred, EU alignment.*

Link to Full Document:
https://www.mcid.gov.ro/wp-content/uploads/2024/07/20240723_SNIA_2024-2027.pdf

Title of the Paper:
New Deal for Industry - Austrian Research Agenda

Type of Document:
Strategy

Authors / Institution:
Österreichische Wissenschaftliche Gesellschaft für Produktionstechnik (ÖWGP)

Year of Publication:
2024

Summary / Abstract:
By addressing key areas such as advanced manufacturing technologies, material science, digital transformation, and circular economy principles, the agenda sets the stage for a new era of industrial excellence. This book aims to provide a comprehensive overview on these key areas, underlining their significance and the pivotal role of Austria's scientific community in driving this transformation.

Keywords: *AI, Additive Manufacturing, Blockchain , Bioeconomy, Decarbonisation, Deep Learning, Digital Twin, Edge AI/Computing/Processing, Internet of Things, Machine Learning, Sustainability, Green AI*

Link to Full Document:
https://www.oewgp.at/wp-content/uploads/2024/12/NewDeal4Industry.pdf

Title of the Paper:
Strategie der Bundesregierung für Künstliche Intelligenz Umsetzungsplan 2024 (AIM AT 2030)

Type of Document:
Strategy

Authors / Institution:
Bundeskanzleramt Österreich und Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

Year of Publication:
2024

Summary / Abstract:
Die österreichische KI-Strategie ist als agile Strategie definiert. Das heißt, sie ist offen für Präzisierungen und Ergänzungen. Der vorliegende Umsetzungsplan ist in diesem Sinne nicht nur als ein erster Zwischenbericht, sondern auch als inhaltliche Ergänzung zu AIM AT 2030 zu verstehen. Der Umsetzungsplan gibt eine Übersicht über 47 Maßnahmen aus allen zwölf Bundesministerien, die im Rahmen der KI-Strategie für den Zeitraum ab 2024 bereits in Umsetzung oder aktuell in Planung sind.

Keywords: *KI, KI-Beirat, KI-Strategie, Generative KI,LLMs), Deep Learning, Rezilience, Klimaneutralität, Cybersecurity, KI-Gesetzes*

Link to Full Document:
https://www.digitalaustria.gv.at/dam/jcr:a293b8fe-0054-4eea-a47b-653f84e4cefb/KI-Umsetzungsplan%202024-mit%20CCBY4.0.pdf

Title of the Paper:
Artificial Intelligence Mission Austria 2030 (AIM AT 2030)

Type of Document:
Strategy

Authors / Institution:
Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK)

Year of Publication:
2021

Summary / Abstract:
Die österreichische Forschungs- und Innovationslandschaft ist im Bereich der Künstlichen Intelligenz gut positioniert und verfügt über eine sehr breite und jahrzehntelange Expertise. Das Klimaschutzministerium (BMK) unterstützte durch seine Förderprogramme in den letzten Jahren großartige Forschungsprojekte und konnte somit zahlreiche Innovationen im Bereich der Künstlichen Intelligenz ermöglichen. Der Fokus der nächsten Jahre soll dabei in der Entwicklung von Technologien im Bereich „AI for Green“ liegen. Die vorliegende Strategie ist das Ergebnis eines breiten Stakeholderprozesses, bei dem über 160 Expertinnen und Experten aus den unterschiedlichen Fachrichtungen eingebunden waren. Die Abstimmung mit den unterschiedlichen Fachdisziplinen, beteiligten Ressorts, Unternehmen und das Einbinden der breiten Bevölkerung wird auch in der Umsetzung das Herzstück der AIM AT 2030 sein

Keywords: *KI, Datenschutz, Vertrauenswürdige KI, menschenzentrierte KI, Wettbewerbsfähigkeit , KI-Ökosystem, KI aus Europa*

Link to Full Document:
https://www.digitalaustria.gv.at/dam/jcr:44ad1b93-6358-42b8-9f65-1e74c9a39e7f/KI%20Strategie_AIM_AT_2030_UAbf.pdf

Title of the Paper:
Strategy for the Development of Artificial Intelligence

Type of Document:
Strategy

Authors / Institution:
Serbian Government

Year of Publication:
2025

Summary / Abstract:
The strategy sets out the Republic of Serbia's strategic framework for the development of artificial intelligence (AI) from 2025 to 2030. It is designed to align with national legislation and international standards, fostering the responsible, secure and human-centred use of AI technologies across public administration, economy and research sectors. The document emphasises strengthening capabilities in data infrastructure, research and innovation, regulatory and governance frameworks, as well as ensuring socio-economic benefits from AI while mitigating associated risks.

Keywords: *artificial intelligence, AI strategy, Serbia, 2025-2030, data infrastructure, research & innovation, governance, regulation, ethical AI, capacity building, public administration, socio-economic development.*

Link to Full Document:
https://pravno-informacioni-sistem.rs/eli/rep/sgrs/vlada/strategija/2025/5/1/reg

Title of the Paper:
Ethical framework for Responsible AI Development

Type of Document:
Strategy

Authors / Institution:
Serbian Government

Year of Publication:
2024

Summary / Abstract:
The decision approves ethical guidelines for the development, application and use of trusted and responsible artificial intelligence (AI) within Serbia. It sets a formal framework to ensure that AI technologies are deployed in a manner that respects fundamental rights, transparency, accountability and societal values. By adopting these guidelines, the Government signals commitment to shaping AI policy in alignment with ethical norms and legal safeguards, and embeds these principles into national governance of AI systems. The guidelines aim to support sustainable innovation and public trust in AI by clarifying roles of institutions, responsibilities of developers/users, and expected standards of behaviour in AI deployment.

Keywords: *ethical guidelines; trusted AI; responsible AI; artificial intelligence; Serbia; governance; transparency; accountability; human-centred technology; public administration; AI regulation; fundamental rights.*

Link to Full Document:
https://pravno-informacioni-sistem.rs/eli/rep/sgrs/vlada/zakljucak/2023/23/1/reg

Title of the Paper:
Ghid AI

Type of Document:
Guidelines/Policy

Authors / Institution:
ECDL Romania

Year of Publication:
2025

Summary / Abstract:
GhidAI.ro is a free online resource launched in Romania by ICDL Romania (formerly ECDL Romania) in partnership with Asociația Oamenilor de Afaceri din România (AOAR), aimed at helping small and medium-sized enterprises (SMEs) understand, evaluate and adopt artificial intelligence (AI) in their operations. The platform provides a practical guide to AI, concrete technological solution examples tailored for the Romanian market, a self-assessment questionnaire for digital maturity, and personalised recommendations for an AI adoption path — all 100% free and online. It addresses a significant gap in digital technology and AI usage among Romanian SMEs: a report cited shows only 2.78% of such firms use AI, compared to 13.48% EU average.

Keywords: *AI literacy, SME digital transformation, Romania, artificial intelligence adoption, digital maturity assessment, practical guide, free online resource, ICDL Romania, AOAR, technology solutions for business.*

Link to Full Document:
https://ghidai.ro/

Title of the Paper:
National AI Development Concept for Bulgaria

Type of Document:
Strategy

Authors / Institution:
Bulgarian Ministry of Transport and IT

Year of Publication:
2020

Summary / Abstract:
The Concept outlines Bulgaria's strategic vision for AI development through to 2030—with the aim of making the country a "high-tech, efficient and sustainable ecosystem for scientific research, technology transfer, original products and services in the field of artificial intelligence." It positions AI as a key driver for digital transformation, economic growth and societal welfare, and emphasises alignment with the European vision of "trustworthy AI" (technology progress together with legal and ethical safeguards). The document sets out main goals such as building the infrastructure for AI, developing research and innovation capacity, improving skills and knowledge, facilitating innovation in priority sectors, unlocking data as a key resource, and establishing a regulatory and trust-building framework. It also addresses the current state of the Bulgarian AI ecosystem (including a SWOT analysis), identifies key challenges (skills gap, fragmented resources, need for data and infrastructure) and lays the groundwork for implementation via an action-plan, monitoring mechanism and financing approach.

Keywords: *artificial intelligence (AI), national strategy Bulgaria, digital transformation, infrastructure, data as raw material, research & innovation, human capital / skills, trustworthy AI / ethics / regulation, priority sectors (industry 4.0, health, agriculture, public administration), monitoring & financing*

Link to Full Document:
https://www.mtitc.government.bg/en/category/167/national-concept-ai-development

Title of the Paper:
National Strategy for AI Education and Upskilling

Type of Document:
Strategy

Authors / Institution:
Bulgarian Ministry of Education

Year of Publication:
2023

Summary / Abstract:
The document titled outlines Bulgaria's vision to integrate artificial intelligence (AI) across the education and science sectors. It emphasises enhancing the national AI-readiness by building competencies, enriching curriculum and research, supporting infrastructure and data usage, while aligning to ethical and human-centred principles. The paper lays out key directions such as raising teacher and student digital-AI literacy, promoting innovative AI-applications in research and teaching, strengthening cooperation between academia, industry and public sector, and developing regulatory frameworks to ensure trust and responsible use of AI systems.

Keywords: *artificial intelligence, AI in education, Bulgaria, teacher competencies, student skills, research innovation, data infrastructure, ethical AI, human-centred AI, curriculum development, education science policy.*

Link to Full Document:
https://www.mon.bg/upload/23352/MON+AI+Doc.pdf

Title of the Paper:
Mapping the regulatory landscape for artificial intelligence in health within the European Union

Type of Document:
Research Paper

Authors / Institution:
Jelena Schmidt; Nienke M. Schutte; Stefan Buttigieg; Diego Novillo-Ortiz; Emma Sutherland; Martin Anderson; Bart De Witte; Margit Peolsson; Benedetta Unim; Mihail Pavlova; Artur Stern; Elias Mossialos; Raymond Van Kessel

Year of Publication:
2024

Summary / Abstract:
Regulatory frameworks for artificial intelligence (AI) are needed to mitigate risks while ensuring the ethical, secure, and effective implementation of AI technology in healthcare and population health. In this article, we present a synthesis of 141 binding policies applicable to AI in healthcare and population health in the EU and 10 European countries. The EU AI Act sets the overall regulatory framework for AI, while other legislations set social, health, and human rights standards, address the safety of technologies and the implementation of innovation, and ensure the protection and safe use of data. Regulation specifically pertaining to AI is still nascent and scarce, though a combination of data, technology, innovation, and health and human rights policy has already formed a baseline regulatory framework for AI in health. Future work should explore specific regulatory challenges, especially with respect to AI medical devices, data protection, and data enablement.

Keywords: *AI regulation; healthcare; EU; policy*

Link to Full Document:
https://www.nature.com/articles/s41746-024-01221-6

DOI: 10.1038/s41746-024-01221-6

Title of the Paper:
A European approach to artificial intelligence ("White Paper")

Type of Document:
Guidelines/Policy

Authors / Institution:
European Commission

Year of Publication:
2020

Summary / Abstract:
The White Paper lays out the EU's overarching AI strategy: promoting "excellence" (research, innovation, investment) and "trust" (ethical, safe, human-centric AI). It proposes a risk-based regulatory framework—ranging from minimal requirements for "low-risk" systems (e.g., transparency obligations for chatbots) to strict rules for "high-risk" use cases (e.g., critical infrastructure, biometric identification). It also sets out policy options for harmonizing national AI laws, ensuring data sharing (through the European Data Strategy), funding R&D, and creating a European AI board for oversight.

Keywords: *AI strategy; risk-based regulation; human-centric AI; data strategy; EU governance*

Link to Full Document:
https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence

Title of the Paper:
EU guidelines on ethics in artificial intelligence – European Parliament briefing

Type of Document:
Guidelines/Policy

Authors / Institution:
EPRS (European Parliamentary Research Service)

Year of Publication:
2019

Summary / Abstract:
This briefing distills key ethical principles (human agency, privacy, transparency, accountability, fairness, societal/environmental well-being) that should guide EU AI policy. It reviews existing soft-law instruments (e.g., EC's "Ethics Guidelines for Trustworthy AI," 2019) and national AI codes of conduct. It highlights gaps—such as enforcement mechanisms—and recommends strengthening oversight bodies, mandating regulatory sandboxes, and fostering multi-stakeholder dialogues.

Keywords: *AI ethics; trustworthy AI; oversight; sandboxes; multi-stakeholder governance*

Link to Full Document:
https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/EPRS_BRI%282019%29640163_EN.pdf

Title of the Paper:
Global Round-Up: National AI Policies (White Paper)

Type of Document:
Guidelines/Policy

Authors / Institution:
Computer & Communications Industry Association (CCIA)

Year of Publication:
2025

Summary / Abstract:
This CCIA White Paper compiles and compares over 70 national AI strategies (EU Member States, OECD countries, emerging economies). It highlights common pillars: ethical guidelines, R&D financing, education/upskilling, data governance, and sectoral use-case roadmaps (e.g., healthcare, transport). It catalogs EU-specific measures (e.g., GDPR alignment, Digital Europe Programme) alongside Member States' approaches (e.g., Germany's "AI made in Germany," France's "AI for Humanity," Spain's "Spain Digital 2025"). It underscores fragmentation risks and calls for EU-level coordination to avoid regulatory divergence.

Keywords: *National AI strategy; EU coordination; ethical AI; data governance*

Link to Full Document:
https://ccianet.org/wp-content/uploads/2025/04/CCIA_Global-Round-Up-National-AI-Policies_Whitepaper.pdf

Title of the Paper:
Artificial Intelligence Policy and the European Union

Type of Document:
Guidelines/Policy

Authors / Institution:
Bipartisan Policy Center (BPC)

Year of Publication:
2022

Summary / Abstract:
Commissioned by U.S. think-tank BPC, this paper contrasts EU's "legislative/regulatory" approach (via GDPR, AI Act) with U.S. "soft-law" methods (voluntary guidelines, industry codes). It details EU legislative proposals: AI Act (2021), Data Governance Act, Digital Services Act, and sectoral initiatives (e.g., "EU Health Data Space"). It critiques potential over-regulation stifling innovation, advocates transatlantic interoperability (e.g., mutual recognition of standards), and recommends "regulatory sandboxes" to test high-risk AI in critical sectors (healthcare, finance) under supervised conditions.

Keywords: *AI Act; transatlantic policy; regulatory sandbox; data governance*

Link to Full Document:
https://bipartisanpolicy.org/wp-content/uploads/2022/08/AI-Policy-and-EU-Final-Paper.pdf

Title of the Paper:
EDF Position Paper on EU Artificial Intelligence Regulation

Type of Document:
Guidelines/Policy

Authors / Institution:
European Disability Forum (EDF)

Year of Publication:
2021

Summary / Abstract:
The EDF (representing persons with disabilities) argues that the EU AI Act must embed non-discrimination and accessibility by design. It urges explicit "reasonable accommodation" clauses, rigorous impact assessments for assistive-tech AI (e.g., voice-recognition, robotics), and inclusive stakeholder consultations. It warns against "ban-list" loopholes that might exclude critical AI tools for persons with disabilities, and calls for harmonized enforcement across Member States.

Keywords: *National AI strategy; EU coordination; ethical AI; data governance*

Link to Full Document:
https://www.edf-feph.org/content/uploads/2021/11/EDF-Position-Paper-on-EU-Artificial-Intelligence-AI-Regulation-1.pdf

Title of the Paper:
A pro-innovation approach to AI regulation (UK White Paper)

Type of Document:
Guidelines/Policy

Authors / Institution:
UK Government (Department for Science, Innovation and Technology)

Year of Publication:
2023

Summary / Abstract:
The UK's White Paper proposes a "pro-innovation" regulatory framework: instead of prescriptive bans, it places "guardrails" around high-risk use-cases (e.g., critical infrastructure, biometric ID) and relies on sectoral regulators (e.g., FCA for finance, MHRA for medical AI). It emphasizes "light touch" oversight—principle-based rules, not detailed mandates—and incentives for voluntary adherence to "UK AI Safety Institute" standards. Feedback mechanisms, continuous horizon-scanning, and a "regulatory sandbox" are central to its design.

Keywords: *Pro-innovation; principle-based; regulatory sandbox; sectoral oversight*

Link to Full Document:
https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper

Title of the Paper:
The EU's AI Act: A framework for collaborative governance

Type of Document:
Study

Authors / Institution:
Matthias Spielkamp, Benedikt Müller, Pierre-Antoine Chamot, et al. (Scholars for Public Interest)

Year of Publication:
2024

Summary / Abstract:
Through the lens of "collaborative governance," the authors argue that the AI Act exemplifies participatory rule-making: its white papers, impact assessments, and public consultations engaged civil society, industry, and academia. The paper breaks down Article 5 (prohibited AI practices), the "high-risk" classification criteria (Annex III), and conformity assessment procedures. It also maps how national AI offices (e.g., Germany's AI Office, FranceAI) will cooperate with the proposed European Artificial Intelligence Board. Finally, it flags enforcement challenges—resource gaps at national authorities—and suggests cross-border cooperation networks to share best practices.

Keywords: *Collaborative governance; conformity assessment; AI Board; enforcement*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S2542660524002324

DOI: 10.1016/j.techsoc.2024.101816

Title of the Paper:
A European approach to excellence and trust: ETNO position paper

Type of Document:
Guidelines/Policy

Authors / Institution:
ETNO (European Telecommunications Network Operators' Association)

Year of Publication:
2024

Summary / Abstract:
ETNO (representing EU telecom operators) welcomes the AI White Paper's risk-based approach but urges alignment with "Telecoms Code," GDPR, and "Digital Services Act" to avoid overlapping compliance burdens. They call for clear definitions—e.g., "digital twin" vs. "digital replica"—and stress interoperability standards for 5G/6G-enabled AI. They also recommend incentivizing edge-AI (privacy-preserving, low-latency) and clarifying the status of "networked AI" (distributed learning across telco networks).

Keywords: *Telecom; interoperability; GDPR; Digital Services Act; edge-AI*

Link to Full Document:
https://connecteurope.org/sites/default/files/2024-09/downloads/positionpapers/etno%2520position%2520on%2520the%2520ec%2520ai%2520white%2520paper_final.pdf

Title of the Paper:
Position Paper: Technical Research and Talent is Needed for Effective AI Governance

Type of Document:
Guidelines/Policy

Authors / Institution:
Anka Reuel; Lisa Soder; Ben Bucknall; Trond Arne Undheim

Year of Publication:
2024

Summary / Abstract:
The authors argue that current policy ambitions (e.g., ethical audits, impact assessments) outpace the technical tooling and expertise available in government institutions. Through a survey of public-sector AI governance documents (EU, US, China), they identify gaps: (1) lack of technical standards for "model transparency" (e.g., API-level logging), (2) scarce talent pipelines—governments lack data scientists to interpret AI metrics, (3) inadequate technical research into "auditability" (e.g., verifying proprietary LLM outputs). They call for public-private R&D partnerships, capacity-building grants for civil-servant upskilling, and embedding "AI/ML liaisons" in regulatory agencies.

Keywords: *Technical capacity; auditability; public-private R&D; talent pipeline*

Link to Full Document:
https://arxiv.org/abs/2406.06987

DOI: 10.48550/arXiv.2406.06987

Title of the Paper:
Artificial intelligence in the agri-food sector Applications, risks and impacts

Type of Document:
Study

Authors / Institution:
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Year of Publication:
2023

Summary / Abstract:
An increasingly digitised society involves recording human activity and monitoring products and processes. In the agri-food sector this gives rise to large quantities of data. At the same time, data is also generated for research and scientific experiments. There is a growing interest in the applications of artificial intelligence (AI) in the agri-food sector to extract or exploit the information that can be detected in these data sets. Artificial intelligence algorithms, and the models derived from them, are used as support systems for better decision making or, in some cases, are implemented in automatic control processes and robotics, to alleviate drudgery. In this study, sensing and data collection in different agri-food sectors are described, together with how the data can lead to better management and better decision making in crop and animal production. As with other technological advances, AI in this domain comes with its own set of benefits, risks, ethical issues and societal implications. Questions raised with respect to AI include: how to balance potential benefits against potential risks; how to govern the use of these technologies; and how to incorporate socio-ethical value considerations into the policy and legal frameworks under development. Policies for training and education have to support potential users.

Keywords: *Agri-food, risks, impacts, robotics*

Link to Full Document:
https://www.europarl.europa.eu/RegData/etudes/STUD/2023/734711/EPRS_STU(2023)734711_EN.pdf

DOI: 10.2861/516636

Title of the Paper:
OECD Artificial Intelligence Review of Germany

Type of Document:
Report

Authors / Institution:
Team from the OECD Directorates for Science, Technology and Innovation (STI), and Employment, Labour and Social Affairs (ELS) led by Lucia Russo, with the support of Noah Oder (consultant to the OECD), with the guidance of Karine Perset, Head of the Artificial Intelligence Unit of the Digital Economy Policy Division. Audrey Plonk, Andrew Wyckoff and Jerry Sheehan, respectively Deputy Director, and former and current Director of STI, provided oversight. Stefano Scarpetta, Director of ELS, and Angelica Salvi Del Pero provided oversight on Chapters 5 and 10. The report also benefitted from the inputs of Hanna-Mari Kilpelainen.

Year of Publication:
2024

Summary / Abstract:
This report provides an international benchmarking of Germany's artificial intelligence (AI) ecosystem and discusses progress in implementing its national AI strategy. The report draws on quantitative and qualitative data and insights from the OECD.AI Policy Observatory and from the OECD Programme on AI in Work, Innovation, Productivity and Skills (AI-WIPS) – an OECD research programme financed by the German Federal Government – and results from a series of interviews with a wide range of stakeholders in Germany. The review discusses Germany's strengths, weaknesses, opportunities, and challenges in AI, and provides recommendations to steer AI policy in Germany in the coming years. The evidence is presented according to the core focus areas outlined in Germany's national AI strategy, which include: 1) minds; 2) research; 3) transfer and applications; 4) the world of work; 5) policy and regulatory frameworks; and 6) society. Furthermore, the report discusses AI infrastructure and it includes three sector spotlights on AI in the public sector, AI and environmental sustainability and AI and healthcare.

Keywords: *Start-ups, infrastructure, strategy, AI*

Link to Full Document:
https://doi.org/10.1787/609808d6-en

Title of the Paper:
Artificial intelligence, its diffusion and uses in manufacturing

Type of Document:
Digital toolkit

Authors / Institution:
Nolan, A., OECD

Year of Publication:
2021

Summary / Abstract:
Using artificial intelligence (AI) and other digital technologies in manufacturing, and other areas of production, is essential for raising labour productivity growth in OECD countries. AI can increase productivity in manufacturing in many ways, from reducing machine downtime to managing supply-chains. However, even in the most advanced economies, the use of AI in manufacturing is limited. This Note discusses the challenges faced by manufacturers in adopting AI and what these imply for the design of policies, including for: skills; institutions for technology diffusion; connectivity; research and manufacturing linkages; computing infrastructure; and, programme evaluation. The Annex provides examples of policy initiatives in a variety of countries.

Keywords: *Manufacturing, production, connectivity*

Link to Full Document:
https://goingdigital.oecd.org/data/notes/No12_ToolkitNote_AI&Manufacturing.pdf

Title of the Paper:
AI Watch: AI uptake in Manufacturing

Type of Document:
Report

Authors / Institution:
Sarah de Nigris, Richard Haarburger, Jiri Hradec, Massimo Craglia, Daniel Nepelski

Year of Publication:
2022

Summary / Abstract:
The report examines how artificial intelligence (AI) is being adopted within the manufacturing sector across the EU. It finds that while AI uptake has accelerated over the past decade, it remains in relatively early stages when it comes to full-scale deployment. Key enablers include access to quality data, standardisation of data formats and communication protocols, and human resource skills (both workforce and management). The analysis also highlights significant regional disparities in adoption: for instance, Germany, France, Italy and Spain lead the rankings within EU27.

Keywords: *Innovation, start-ups, automatisation*

Link to Full Document:
https://ai-watch.ec.europa.eu/publications/ai-watch-ai-uptake-manufacturing_en

DOI: 10.2760/267198

Title of the Paper:
White Book on AI and Data Governance

Type of Document:
Guidelines/Policy

Authors / Institution:
Sub-Council for Artificial Intelligence and Data Governance, Ministry of Economic Development and Digitalization

Year of Publication:
2024

Summary / Abstract:
This publication is a policy statement document by the Sub-Council for Artificial Intelligence and Data Governance (SCIA). It provides expert advice and informs the future policy and regulatory framework for AI and data governance in the Republic of Moldova. The contents of this publication reflect the position of the Government of the Republic of Moldova.

Keywords: *AI governance, data governance, EU alignment, regulatory sandbox, digital transformation Moldova*

Link to Full Document:
https://drive.google.com/file/d/1d2VmubZJjwVjzxUT4gjJE7DXTinzdyfO/view

Title of the Paper:
Global Trends in AI Governance

Type of Document:
Report

Authors / Institution:
World Bank

Year of Publication:
2024

Summary / Abstract:
The report outlines how countries can harness the rapid advances in artificial intelligence (AI) to promote growth, inclusion and innovation — while also managing associated risks such as bias, privacy harms, cyber-threats and governance deficits. It emphasises the foundational building blocks ("enabling foundations") for AI-ecosystems: reliable digital and data infrastructure, human capital, high-quality multimodal data, computational power, and enabling policy/regulatory frameworks. The report also presents a layered framework of AI governance: combining laws/regulation, institutional oversight, technical standards, private codes of practice and international cooperation to create trustworthy, inclusive and resilient AI systems.

Keywords: *AI governance, World Bank, global policy*

Link to Full Document:
https://documents1.worldbank.org/curated/en/099120224205026271/pdf/P1786161ad76ca0ae1ba3b1558ca4ff88ba.pdf

Title of the Paper:
Small Businesses' Guide to the EU AI Act

Type of Document:
Guidelines/Policy

Authors / Institution:
AI Act Platform

Year of Publication:
2024

Summary / Abstract:
The guide titled *"Small Businesses' Guide to the EU AI Act"* provides an accessible overview of how small and medium-sized enterprises (SMEs) can comply with the upcoming EU regulation on artificial intelligence. It highlights key SME-friendly provisions: priority access to regulatory sandboxes, reduced compliance costs and fees, tailored documentation and training, and proportional obligations for smaller providers of AI systems.

Keywords: *AI Act, compliance, SMEs*

Link to Full Document:
https://artificialintelligenceact.eu/small-businesses-guide-to-the-ai-act/

Title of the Paper:
Job Creation and Local Economic Development 2024. The Geography of Generative AI

Type of Document:
Report

Authors / Institution:
OECD

Year of Publication:
2024

Summary / Abstract:
The 2024 OECD report analyzes how regional labor markets are coping with demographic shifts, low productivity, and persistent shortages. It introduces new data on regional labor imbalances and examines how Generative AI could reshape job creation and economic development. The report maps which regions and worker groups are most exposed to Generative AI, compares this with past automation waves, and outlines localized policy actions to boost productivity, address shortages, and manage displacement risks.

Keywords: *AI, labour market transformation, regional disparities, job creation, automation impact*

Link to Full Document:
https://www.oecd.org/en/publications/job-creation-and-local-economic-development-2024_83325127-en.html

DOI: https://doi.org/10.1787/83325127-en

Title of the Paper:
Artificial Intelligence for Inclusive Sustainable Development and Inequalities Reduction

Type of Document:
Digital toolkit

Authors / Institution:
Digital Economy Working Group, UNESCO

Year of Publication:
2024

Summary / Abstract:
The G20 AI Readiness Toolkit, led by Brazil's G20 Presidency, offers a structured framework to assess how prepared countries are to develop and use AI ethically and responsibly. It combines a questionnaire based on UNESCO's Readiness Assessment Methodology (RAM) with international data from ITU, OECD, and the World Bank. It evaluates six dimensions: national policies, infrastructure, scientific/educational capacity, legal frameworks, social/cultural aspects, and workforce readiness. The Toolkit expands on RAM by emphasizing inclusiveness and equitable access to AI resources, aiming to support balanced global AI development.

Keywords: *AI readiness, capacity assessment, inclusive development*

Link to Full Document:
https://cetic.br/media/docs/publicacoes/1/20241209153401/G20_DEWG_Brasi_%202024_Toolkit_for_AI_Readiness_and_Capacity_Assessment.pdf

Title of the Paper:
Generative AI Outlook Report - Exploring the Intersection of Technology, Society and Policy

Type of Document:
Report

Authors / Institution:
ABENDROTH DIAS, K., ARIAS CABARCOS, P., BACCO, F.M., BASSANI, E., BERTOLETTI, A. et al.

Year of Publication:
2025

Summary / Abstract:
The report entitled "Generative AI Outlook Report – Exploring the Intersection of Technology, Society and Policy" (JRC142598) released by the Joint Research Centre (JRC) of the European Commission on 13 June 2025 examines the status, trends and implications of generative artificial intelligence (GenAI) within the European Union. It begins by outlining the current technological capabilities of GenAI and emerging developments, moves on to explore economic and productivity impacts (including shifts in industry dynamics and the nature of work), then assesses societal and ethical dimensions (such as bias, misinformation, inclusivity, and labour disruption) and finally reviews regulatory and policy frameworks (including the forthcoming AI Act, data legislation and trustworthiness requirements). The report concludes that while GenAI holds exceptional promise for innovation and societal benefit, the rapid pace of change and scale of systems pose significant governance, ethical and structural challenges — requiring a coordinated, nuanced and values-based policy response to align technological developments with democratic principles and legal frameworks.

Keywords: *Generative AI, EU, innovation, regulation, societal impact*

Link to Full Document:
https://publications.jrc.ec.europa.eu/repository/handle/JRC142598

DOI: https://dx.doi.org/10.2760/1109679

Title of the Paper:
The AI Continent Action Plan

Type of Document:
Strategy

Authors / Institution:
European Commision

Year of Publication:
2025

Summary / Abstract:
The European Union is committed and determined to become a global leader in Artificial Intelligence, a leading AI continent. This Communication outlines a set of bold actions to achieve that goal. AI has just begun to be adopted in the key sectors of our economy, helping to tackle some of the most pressing challenges of our times. While the full impact of this transformational shift is still unfolding, Europe must act with ambition, speed and foresight to shape the future of AI in a way that enhances our competitiveness, safeguards and advances our democratic values and protects our cultural diversity. A trustworthy and human centric AI is both pivotal for economic growth and crucial for preserving the fundamental rights and principles that underpin our societies. Swift policy action is of highest priority.

Keywords: *AI Factories, Gigafactories, Invest AI, Data Union, Apply AI, AI Talent Development, Trustworthy AI, Human-Centric AI*

Link to Full Document:
https://digital-strategy.ec.europa.eu/en/library/ai-continent-action-plan

Title of the Paper:
Guidelines for providers of general-purpose AI models.

Type of Document:
Guidelines/Policy

Authors / Institution:
European Commision

Year of Publication:
2025

Summary / Abstract:
The Commission has issued guidelines to clarify the scope of the obligations for providers of general-purpose AI models under the AI Act. These obligations enter into application on 2 August 2025. The guidelines on the scope of obligations for providers of general-purpose AI (GPAI) models help actors in the AI ecosystem understand whether the obligations apply to them and what is expected of them, ensuring they can innovate with confidence. Key points of the guidelines: clear definitions, pragmatic approach, exemptions for open-source.

Keywords: *General-Purpose AI (GPAI) Models, AI Act Compliance, Systemic Risk Notification, Open-Source Exemptions, Technical Criteria & Definitions, Code of Practice*

Link to Full Document:
https://digital-strategy.ec.europa.eu/en/policies/guidelines-gpai-providers

CHAPTER II. Practical AI Applications

The Practical AI Applications category showcases real-world examples of AI adoption by SMEs, start-ups, industry actors, and technology providers. It includes case studies, product descriptions, best practices, and implementation stories illustrating how AI is being used to improve operations, productivity, and competitiveness. These examples demonstrate the tangible benefits of AI—from yield prediction in agriculture to predictive maintenance in manufacturing, from automated energy management to advanced health diagnostics. They highlight the pathways through which businesses, including small enterprises, can adopt AI gradually and efficiently.

This category is particularly relevant to the BrAIn project's goal of supporting SMEs in the Danube Region. Many SMEs face challenges such as limited budgets, lack of internal technical expertise, unclear return on investment, or difficulties integrating AI with legacy equipment. By presenting relatable success stories and step-by-step examples of implementation, the documents in this category provide practical guidance and inspiration. They showcase tested solutions, innovative business models (such as robotics-as-a-service), and the measurable results achieved by early adopters.

Moreover, the examples included here illustrate that AI is not reserved for high-tech industries alone. They show how traditional sectors—such as farming, logistics, retail, or hospitality—can benefit from AI when solutions are well-designed and aligned with operational needs. This category therefore serves as an important bridge between theoretical insights and practical action, offering replicable ideas, concrete solutions, and lessons learned from real-world experience. For stakeholders exploring AI adoption, these resources provide both motivation and direction.

Title of the Paper:
Agri-TechE

Type of Document:
Project / Project deliverable

Authors / Institution:
Agri-TechE

Year of Publication:
N/A

Summary / Abstract:
Agri-TechE is a UK-based independent, not-for-profit network bringing together farmers, technologists, researchers, agribusinesses and policymakers to accelerate innovation in agriculture. The organisation offers membership, shares knowledge (via a robust "Knowledge Hub"), hosts events, and provides an "Opportunity Zone" for funding, jobs and early-career support. It aims to bridge the gap between emerging agri-tech solutions (including areas like AI, robotics, soil & water management, digital farm management) and real-world farm-scale application, thus supporting a more sustainable and productive agri-food system.

Keywords: *agri-tech; agriculture innovation; farmers; researchers; technology adoption; independent membership network; knowledge hub; events & networking; funding & opportunities; digital farm management; soil & water management; precision agriculture; robotics & AI in farming.*

Link to Full Document:
https://www.agri-tech-e.co.uk/

Title of the Paper:
HealthData@EU Central Platform

Type of Document:
Project / Project deliverable

Authors / Institution:
Directorate-General for Health and Food Safety

Year of Publication:
2025

Summary / Abstract:
The HealthData@EU Central Platform is an open-source infrastructure initiative launched by the European Commission to support the implementation of the European Health Data Space (EHDS). It serves as a central hub to connect national health-data platforms across EU Member States, enabling secure and harmonised secondary use of health-related data (for research, policy-making, innovation and public health purposes) while maintaining strict safeguards for privacy, interoperability and data quality. The source code and technical documentation are publicly available via the portal at code.europa.eu.

Keywords: *health data, open-source platform, cross-border data, research & innovation, European Health Data Space, data interoperability, metadata standard (Health DCAT-AP), regulation, secondary use, infrastructure, data governance, security.*

Link to Full Document:
https://code.europa.eu/healthdataeu

Title of the Paper:
Beehold -Beekeepers' Digital Assistant

Type of Document:
Product page

Authors / Institution:
N/A

Year of Publication:
2024

Summary / Abstract:
Beehold offers an AI-driven hardware-and-software system for beekeepers that enables **remote, real-time hive monitoring**. Their solution uses sensors placed in or on beehives to collect data (temperature, humidity, weight, activity), integrates with a mobile or dashboard app, and employs artificial intelligence to provide analytics, alerts and recommendations for optimal hive management. By reducing the need for manual inspections (opening hives) and enabling proactive decision-making, Beehold's system aims to increase honey yields, improve hive health, reduce losses, and support the beekeeper's productivity and income. The company is based in Serbia (Niš) and has developed the product through prototype testing, including in Kenya.

Keywords: *Wineyards; IoT*

Link to Full Document:
https://www.beehold.tech/solution

Title of the Paper:
Catalogue for sustainable policy instruments and business solutions

Type of Document:
Catalogue

Authors / Institution:
BrAIn project

Year of Publication:
2024

Summary / Abstract:
The BrAIn project is a trans-national initiative under the Interreg Danube Region Programme that focuses on strengthening the AI ecosystem in the Danube area. It aims to support the development and deployment of artificial intelligence technologies in a way that is resilient, inclusive and regionally integrated. The project collects and shares knowledge, resources and best practices via its "Library" section (page 2 lists additional documents). The emphasis is on capacity-building, collaboration across sectors and countries, and enabling smaller organisations and local actors to adopt AI in meaningful ways.

Keywords: *Danube Region, artificial intelligence, AI ecosystem, resilience, knowledge sharing, trans-national cooperation, capacity building, best practices, library of resources, regional innovation.*

Link to Full Document:
https://interreg-danube.eu/projects/brain/library?page=2

Title of the Paper:
European AI Office

Type of Document:
Project / Project deliverable

Authors / Institution:
European Commission

Year of Publication:
2024

Summary / Abstract:
The European AI Office (EAIO) is a central body established by the European Commission within the EU's digital strategy framework to steer the development, deployment and governance of artificial intelligence (AI). It supports the implementation of the Artificial Intelligence Act across the Member States, especially in relation to general-purpose AI models, strengthens the ecosystem of trustworthy AI, and coordinates European policy, innovation and international cooperation in AI.

The Office is tasked with regulatory compliance (via tools, evaluation of models, sanctions), promoting AI adoption and innovation (through sandboxes, uptake policies), and monitoring systemic risks while coordinating with national authorities and international partners. It functions through several specialised units (e.g., Regulation & Compliance, AI Safety, Innovation & Policy Coordination) and works alongside the European Artificial Intelligence Board to ensure coherent governance.

Keywords: *European AI Office; AI governance; EU digital strategy; Artificial Intelligence Act; trustworthy AI; general-purpose AI; regulatory compliance; innovation and adoption; AI safety; sandboxes; AI Continent Action Plan; Apply AI Strategy.*

Link to Full Document:
https://digital-strategy.ec.europa.eu/en/policies/ai-office

Title of the Paper:
TEF Agrifood

Type of Document:
Project / Project deliverable

Authors / Institution:
TEF Agrifood

Year of Publication:
2023

Summary / Abstract:
agrifoodTEF is a pan-European network of testing and experimentation facilities (TEFs) launched in January 2023 and running through December 2027, funded under the EU's Digital Europe programme. Its mission is to empower innovators—particularly SMEs—within the agrifood sector to validate, test and accelerate their AI and robotics solutions under real-world conditions across a variety of sub-sectors (arable farming, horticulture, tree crops, viticulture, livestock farming, greenhouse production, food processing). By offering a catalogue of services (e. g., user-acceptance testing, camera/perception system evaluation, digital maturity assessment, business model validation) through nodes in multiple European countries, agrifoodTEF seeks to bridge the gap between research & development and commercial deployment, while also aligning with regulatory, data-governance and sustainability objectives.

Keywords: *agrifoodTEF, AI & robotics, agrifood sector innovation, testing and experimentation facilities, real-world validation, digitalisation of agriculture, SME support, service catalogue, multi-country network, infrastructure for agritech, deployment readiness, regulation & compliance, sustainable food production, robotics in agrifood.*

Link to Full Document:
https://agrifoodtef.eu/

Title of the Paper:
Der Weg zur digitalen Transformation in der Produktion

Category / Theme:
Practical AI Applications (SME case studies, AI adoption in business, industry success stories)

Type of Document:
Catalogue

Authors / Institution:
(e.g. OECD, World Bank, Local Research Institute, etc.)

Year of Publication:
2025

Summary / Abstract:
Die AI5production-Studie dokumentiert den erfolgreichen Einsatz des European Digital Innovation Hub (EDIH) AI5production, der die digitale Transformation von produzierenden Unternehmen vorantreibt. Unter der Koordination der TU Wien und mit Unterstützung von 17 Partnerinstitutionen hat der Hub maßgeschneiderte Lösungen für die Industrie 4.0 entwickelt. Mit einem Fokus auf „Test-before-invest"-Projekte ermöglicht der Hub Unternehmen, neue Technologien risikofrei zu erproben. Seit seiner Gründung hat der Hub über 100 erfolgreiche Digitalisierungsprojekte und die Schulung von hunderten Fachkräften erzielt. Die Studie hebt hervor, wie AI5production die Effizienz und Nachhaltigkeit der Unternehmen stärkt und ihre Wettbewerbsfähigkeit auf globalen Märkten fördert. Zudem wird der Hub als Schlüsselakteur im Technologietransfer und der Förderung von Innovationen in der europäischen Industrie dargestellt, mit Blick auf die Entwicklung hin zu Industrie 5.0.

Keywords: *European Digital Innovation Hub (EDIH), ünstlicher Intelligenz und Digitalisierung, Industrie 4.0 und 5.0, „Test-before-invest"-Projekte, AI in der Produktion, maßgeschneiderte Lösungen für die Industrie*

Link to Full Document:
https://ai5production.at/success-story/

Title of the Paper:
AI extension module AE 550

Type of Document:
Product page

Authors / Institution:
KEBA

Year of Publication:
2025

Summary / Abstract:
The KEBA AI Extension Module AE 550 is high-performance hardware in a compact form factor, developed specifically for industrial AI applications. It allows on-device execution of neural networks (inference) directly in automation systems (e.g., machine controls) without relying solely on cloud connectivity. Designed for rugged industrial use (long-term availability, real-time capability, modular scalability), it integrates with KEBA's control platform (e.g., KeControl C5) and offers a toolchain to collect, process and interpret data for tasks such as object recognition, instance segmentation, grasp-point detection etc. It is currently available in an Early Access Programme as a development kit (DevKit) combining a Linux control unit, digital I/O card and the AE 550 module, enabling companies to start industrial AI projects.

Keywords: *Early Access Program (EAP), AI Extension Module, Industrial Controller, AI applications in industry, Real-time capability*

Link to Full Document:
https://www.keba.com/en/industrial-automation/products/controls-ipc/ai-extension-module

Title of the Paper:
QML4Med: Quantum computing meets machine learning in medicine

Type of Document:
Project / Project deliverable

Authors / Institution:
RISC

Year of Publication:
2025

Summary / Abstract:
The research project QML4Med aims to explore the potential of the promising fusion of Quantum Computing and Machine Learning in the medical context. This project is funded by the FFG Austrian Research Promotion Agency. RISC Software GmbH will investigate three clinical use cases on simulated and real quantum hardware:1. Prediction of complications following blood transfusions; 2. ECG diagnostics, e.g., detection of arrhythmias; 3. Pathology detection from image data. The project will analyze achieved model accuracies, the impact of noise interference, quantum encoding methods, and model explainability (explainable AI).

Keywords: *Quantum Computing, Machine Learning, Medicine, Bllod Transfusion, Explainable AI, ECG Dianostics, Pathology detection*

Link to Full Document:
https://www.risc-software.at/en/referenceprojects/qml4med/

Title of the Paper:
Making Your Enterprise GenAI Ready and GenAI Enterprise Ready

Type of Document:
Product page

Authors / Institution:
Class Central

Year of Publication:
2023

Summary / Abstract:
A video lecture showing best practices in preparing your org for the challenges and opportunities offered with GenAI, and what you need to do in the GenAI space to ensure the GenAI capabilities are on a par with Enterprise security, privacy, guardrails. We will provide an overview of Google Cloud's innovation with GenAI in the Enterprise: This session will discuss how GenAI can be effectively utilized to meet the demanding requirements of Enterprise environments, resulting in a more relevant and scalable solutions focused on AI/ML workloads. GenAI is more than a buzzword and our enterprises are seeing the true value of our generative AI offerings in action.

Keywords: *enterprise readiness; generative AI (GenAI); AI adoption strategy; organisational change; AI governance; scalability; data readiness; integration with legacy systems; risk management; innovation culture; deployment-lifecycle; operationalising AI.*

Link to Full Document:
https://www.classcentral.com/classroom/youtube-making-your-enterprise-genai-ready-and-genai-enterprise-ready-319408

Title of the Paper:
Discoverer: Bulgaria's EuroHPC Supercomputer

Type of Document:
Report

Authors / Institution:
Bulgarian State Agency for Information Technology and Communications (SAITC)

Year of Publication:
2021

Summary / Abstract:
The article on Supercomputing in Europe reviews Europe's landscape in high-performance computing (HPC). It describes the evolution of supercomputing infrastructure, highlighting key national centres, flagship systems and collaborative frameworks such as the European High-Performance Computing Joint Undertaking (EuroHPC). The piece explains how Europe is building large-scale computing power to support scientific research, industrial innovation and digital sovereignty—among other aims—and outlines challenges including funding, energy efficiency, technology sovereignty and the "race" to exascale performance.

Keywords: *Europe; supercomputing; high-performance computing (HPC); exascale; EuroHPC; research infrastructure; digital sovereignty; energy efficiency; national supercomputing centres; infrastructure collaboration.*

Link to Full Document:
https://en.wikipedia.org/wiki/Supercomputing_in_Europe

Title of the Paper:
Intelligent Building Control Systems for Thermal Comfort and Energy-Efficiency: A Systematic Review of AI-Assisted Techniques

Type of Document:
Research paper

Authors / Institution:
arXiv (Cornell University)

Year of Publication:
2021

Summary / Abstract:
The paper titled reviews how artificial intelligence (AI) techniques have been applied in building control systems to optimise thermal comfort while reducing energy use for HVAC (heating, ventilation and air-conditioning) systems. It examines about 20 AI-based tools/models that perform tasks such as pattern identification, optimisation and predictive control. The authors find that AI applications in buildings show promise, yet performance is not fully mature, often due to lack of large, high-quality real-world data in the building/energy sector.

Keywords: *building control; thermal comfort; energy-efficiency; HVAC; artificial intelligence; predictive control; optimisation; pattern recognition; real-world data shortage; smart buildings; machine learning; systematic review.*

Link to Full Document:
https://arxiv.org/abs/2104.02214

Title of the Paper:
Top 25 SMEs Driving AI-Driven Precision Agriculture in 2025

Type of Document:
Catalogue

Authors / Institution:
Omdena (compiled by Omdena editorial team)

Year of Publication:
2025

Summary / Abstract:
This May 16, 2025 article profiles 25 European and global SMEs that have successfully operationalized AI to enable precision-agriculture solutions (e.g., crop monitoring, automated spraying, yield prediction). The article highlights "Precision Agriculture AI Adoption Quadrant," classifying SMEs by their breadth (number of farm processes automated) and depth (model sophistication) of AI integration. Overall, these success stories demonstrate tangible ROI—average yield increases of 15 percent and resource savings of 20 percent—when SMEs partner with research institutions and leverage cloud/edge AI platforms.

Key Findings / Insights:
- SMEs like Agroscout and Prospera use computer vision and deep learning to detect crop stress early, reducing pesticide use by 30 percent.
- FarmWise and Naïo Technologies deploy autonomous robots for weeding and harvesting, cutting labor costs by 40 percent.
- Startups such as Frubana leverage ML-based demand forecasting to optimize supply-chain logistics for perishable goods, decreasing post-harvest losses by 25 percent.

Keywords: *Precision agriculture; computer vision; autonomous robots; yield prediction; supply-chain optimization*

Link to Full Document:
https://www.omdena.com/blog/top-25-smes-driving-ai-driven-precision-agriculture-in-2025

Title of the Paper:
AI, robots and innovation in European SMEs

Type of Document:
Research Paper

Authors / Institution:
Francesco Schiavone, Federico Pigni, – et al. (University of Naples Federico II; Bocconi University)

Year of Publication:
2025

Summary / Abstract:
This March 2025 peer-reviewed paper empirically examines how the adoption of AI and robotics correlates with product, process, organizational, and marketing innovations among EU SMEs (n = 1,200). The study highlights key drivers: digital infrastructure, skilled personnel, and participation in EU-funded R&D consortia. It also identifies barriers—cost of pilot projects, lack of in-house expertise, and regulatory uncertainty—especially for sub-€10 million-revenue firms.

Key Findings / Insights:
Using Flash Eurobarometer 486 data, the authors find:
• 40 percent of manufacturing SMEs adopting advanced AI/robotics report new product launches within 12 months.
• Service-sector SMEs that implement AI chatbots or recommendation engines see a 25 percent increase in customer retention.
• Conversely, AI adoption in low-tech SMEs yields smaller gains unless combined with organizational change.

Keywords: *AI adoption; robotics; SME innovation; EU funding; digital infrastructure*

Link to Full Document:
https://link.springer.com/article/10.1007/s11187-025-01017-2

DOI: 10.1007/s11187-025-01017-2

Title of the Paper:
Driving SME innovation with AI solutions: overcoming adoption barriers

Type of Document:
Research Paper

Authors / Institution:
International Journal of Science and Technology Research Archive (IJSTRA)

Year of Publication:
2024

Summary / Abstract:

This 2024 IJSTRA paper presents multiple case studies of SMEs across Europe and Asia that overcame organizational and technical hurdles to implement AI solutions. The authors systematically catalog "success factors"—leadership buy-in, incremental pilots, cross-functional teams, and close vendor partnerships—and contrast them with common pitfalls (e.g., "pilot purgatory," skills gaps, data silos). They conclude with a prescriptive framework for SMEs to scale AI from Proof of Concept (PoC) to full production.

Key Findings / Insights:

- Czech manufacturing SME integrated a computer-vision defect detection system on its assembly line—reducing scrap rate by 18 percent within six months.
- An Irish hospitality group deployed an AI-powered pricing engine (dynamic pricing based on occupancy and demand forecasts), boosting RevPAR (Revenue per Available Room) by 12 percent.
- A Lithuanian logistics startup implemented an AI-driven route-optimization platform that cut delivery times by 22 percent and diesel costs by 15 percent.

Keywords: *Case studies; defect detection; dynamic pricing; route optimization; PoC to production*

Link to Full Document:
https://sciresjournals.com/ijstra/sites/default/files/IJSTRA-2024-0055.pdf

Title of the Paper:
Artificial intelligence implementation in manufacturing SMEs

Type of Document:
Research Paper

Authors / Institution:
Giorgia Giardoni, Alessandra Bellini, Roberto Guidotti (Politecnico di Milano; University of Modena and Reggio Emilia)

Year of Publication:
2024

Summary / Abstract:
In this September 2024 article, the authors conduct six in-depth case studies of Italian manufacturing SMEs (furniture, textile, food packaging) that implemented AI systems for quality control and predictive maintenance. Key outcomes: Barriers included data-integration challenges with legacy machines and initial reluctance from shop-floor staff. The paper recommends a phased rollout: start with narrowly scoped pilot (e.g., one production cell), invest in cross-training engineers, and partner with local research labs to build trust.

Key Findings / Insights:
- Furniture SME replaced manual inspection with an ML-powered vision system—detection accuracy improved from 82 percent to 96 percent; labor allocation shifted to higher-value tasks.
- Textile SME deployed an AI-based energy-management platform, reducing electricity consumption by 14 percent and CO_2 emissions by 10 percent.
- Food-packaging SME integrated predictive maintenance on CNC machines—unplanned downtime dropped by 38 percent in one year.

Keywords: *Quality control; predictive maintenance; energy management; data integration; pilot rollout*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S026840122400029X

DOI: 10.1016/j.techfore.2024.122400029X

Title of the Paper:
How AI helps small newcomers compete with the giants

Type of Document:
Review

Authors / Institution:
Aaron Kirchhoff (Reuters, paraphrased by Reuters Legal)

Year of Publication:
2024

Summary / Abstract:
In this June 2024 feature, various small businesses (hotels, retailers, logistics startups) illustrate AI's leveling effect. The article quotes experts who stress that SMEs' agility allows them to pilot AI quickly (2–3 months) compared to large incumbents (12–18 months). However, concerns remain around data privacy compliance (GDPR) and upfront costs of cloud-based AI services.

Keywords: *Chatbots; demand forecasting; inventory management; competitive advantage; GDPR compliance*

Link to Full Document:
https://www.thetimes.co.uk/article/how-ai-helps-small-newcomers-compete-with-the-giants-enterprise-network-mqbgvwbqt

Title of the Paper:
Harvest AI: Advanced AI for Indoor Farming Yield Predictions

Type of Document:
Project / Project deliverable

Authors / Institution:
Harvest AI (Germany)

Year of Publication:
2024

Summary / Abstract:
Harvest AI's platform integrates computer vision and machine learning to deliver real-time crop growth and yield predictions for vertical and indoor farms. By analyzing multispectral sensor data and environmental parameters (temperature, humidity, CO_2), operators receive precise harvest schedules and nutrient recommendations. A recent pilot in a German vertical farm demonstrated a 12 % increase in lettuce yield and a 15 % reduction in resource usage (water, energy) compared to conventional scheduling methods. Harvest AI's cloud-based dashboard enables operators to simulate "what-if" scenarios, adjusting light intensity and nutrient levels to optimize market timing; early adopters report up to 20 % higher revenue through improved product quality and reduced spoilage.

Keywords: *Indoor farming; yield prediction; computer vision; resource optimization*

Link to Full Document:
https://www.eitfood.eu/news/four-winners-fast-track-to-market-2024#harvest-ai

Title of the Paper:
FarmWise: Autonomous Weeding Robotics as a Service

Type of Document:
Product Page

Authors / Institution:
FarmWise Labs (USA; serving European markets)

Year of Publication:
2025

Summary / Abstract:
FarmWise provides autonomous mechanical weeding "robots as a service" to vegetable growers. Its Titan FT-35 machines combine high-resolution cameras, LiDAR, and deep learning algorithms trained on millions of plant images to differentiate weeds from crops. In European field trials (France and Netherlands, 2024), FarmWise robots reduced herbicide usage by 70 % and labor costs by 40 % for organic vegetable producers. The subscription model (fee per acre) allows small and mid-sized farms to adopt robotic weeding without capital expenditure. Weekly software updates incorporate new crop types (e.g., asparagus, strawberries), and the latest model achieves 98 % precision in plant detection, translating to a 25 % average yield increase for early customers.

Keywords: *Autonomous weeding; computer vision; subscription model; herbicide reduction*

Link to Full Document:
https://en.wikipedia.org/wiki/FarmWise

Title of the Paper:
Farmer.Chat: Scaling AI-Powered Agricultural Advisory for Smallholder Farmers

Type of Document:
Research Paper

Authors / Institution:
Singh N., Wang'ombe J., Okanga N., Zelenska T., Repishti J., G K Jayasankar, Mishra S., Manokaran R., Singh V., Rafiq M I, Gandhi R, Nambi A

Year of Publication:
2024

Summary / Abstract:
Farmer.Chat is a generative-AI chatbot designed to deliver personalized agronomic advice to smallholder farmers in multiple languages (English, Swahili, Hindi, Spanish). Deployed across four pilot regions (Kenya, India, Nigeria, Ukraine) between early 2024 and mid-2024, the platform engaged over 15,000 farmers and processed more than 300,000 queries on topics such as pest control, weather forecasting, and planting schedules. By leveraging a fine-tuned LLM (incorporating local agronomic datasets and extension-agent feedback), Farmer.Chat achieved a 92 % user satisfaction rate and reduced reliance on in-person extension visits by 60 %. Quantitative evaluation shows a 10 % average increase in yield among active users, while qualitative interviews highlight increased trust due to localized language support and context-aware recommendations.

Keywords: *AI; smallholders; multilingual chatbot; yield impact*

Link to Full Document:
https://arxiv.org/abs/2409.08916

DOI: 10.48550/arXiv.2409.08916

Title of the Paper:
Vision-Based Automatic Fruit Counting with UAV

Type of Document:
Research Paper

Authors / Institution:
Szolc H., Wasala M., Mietla R., Iwicki K., Kryjak T

Year of Publication:
2025

Summary / Abstract:
This work presents a UAV-mounted vision system for real-time fruit counting in orchards. An RGB camera plus depth sensor feed a lightweight CNN that distinguishes fruits from foliage; a trajectory-planning module minimizes flight time over large groves. Tested on 500 missions (simulated and real) across Polish apple orchards, the system achieved an average accuracy score of 87.27/100 in simulation and 84.83/100 in field trials, ranking 6th out of 23 teams at ICUAS 2024. Growers reported that automated counts reduced manual labor by 75 % and improved harvest planning precision by 20 %. The authors emphasize the system's modularity: swapping cameras or models requires minimal re-training using transfer-learning techniques on region-specific datasets.

Keywords: *UAV; fruit counting; computer vision; CNN; trajectory planning*

Link to Full Document:
https://arxiv.org/abs/2503.13080

DOI: 10.48550/arXiv.2503.13080

Title of the Paper:
A Reinforcement Learning Approach to Dairy Farm Battery Management Using Q-Learning

Type of Document:
Research Paper

Authors / Institution:
Ali N., Wahid A., Shaw R., Mason K

Year of Publication:
2024

Summary / Abstract:
In this study, the authors apply Q-learning to optimize battery charging/discharging in an Irish dairy farm microgrid that integrates solar panels and wind turbines. The RL agent considers real-time electricity prices, farm load profiles, and weather forecasts to minimize grid imports. Compared to a rule-based baseline, the Q-learning strategy reduced imported energy costs by 13.41 %, peak demand by 2 %, and, when integrating wind generation data, by 24.49 %. Farmers reported a 10 % improvement in overall energy self-sufficiency. The codebase, published on GitHub, includes environment simulators derived from actual farm data, enabling replication across similar dairy operations in Europe.

Keywords: *Reinforcement Learning; battery management; dairy farm; renewable integration*

Link to Full Document:
https://arxiv.org/abs/2403.09499

DOI: 10.48550/arXiv.2403.09499

Title of the Paper:
Enhancing Strawberry Yield Forecasting with Backcasted IoT Sensor Data and Machine Learning

Type of Document:
Research Paper

Authors / Institution:
Ayall T A., Li A., Beddows M., Markovic M., Leontidis G

Year of Publication:
2025

Summary / Abstract:
Deployed in UK polytunnels over four seasons (two with IoT sensors, two without), this project uses backcasting to generate synthetic environmental data (temperature, humidity, soil moisture) for missing seasons based on historical weather records. The AI model—combining LSTM and XGBoost—uses both real and synthetic data to forecast strawberry yields. Experiments show that models trained on hybrid datasets achieved a 15 % lower RMSE compared to those using only real data (3.2 vs. 3.8 kg/m²). Growers utilizing the forecasts improved packing and distribution planning, reducing post-harvest losses by 18 %. The authors highlight that this backcasting approach can generalize to other high-value crops where sensor deployment is intermittent.

Keywords: *IoT sensors; backcasting; yield forecasting; LSTM; XGBoost*

Link to Full Document:
https://arxiv.org/abs/2504.18451

DOI: 10.48550/arXiv.2504.18451

Title of the Paper:
Taranis Ag Assistant™: Generative AI for Leaf-Level Agronomic Recommendations.

Type of Document:
Product Page

Authors / Institution:
Taranis (Israel; serving EU markets)

Year of Publication:
2024

Summary / Abstract:
Taranis's Ag Assistant™ leverages a generative AI model trained on proprietary agronomic datasets (drone imagery, satellite maps, weather data, university research) to produce field-specific, actionable recommendations for growers and advisors. Launched July 2024, the platform ingests leaf-level images from drones, identifies disease or pest pressure using a CNN, then contextualizes findings via a GenAI layer to suggest treatments (e.g., optimal pesticide types, timing). In early pilots across Midwestern vineyards and French cereal fields, users reported a 20 % reduction in overall input costs and a 12 % increase in crop health scores (measured via NDVI indices) compared to baseline scouting practices. Ag Advisor workflows accelerated decision cycles by 70 %, enabling rapid response to emerging threats.

Keywords: *Generative AI; leaf-level imagery; crop health; agronomic recommendations*

Link to Full Document:
https://www.taranis.com/newsroom/ag-assistant/

Title of the Paper:
Plantix: Mobile Crop Advisory App.

Type of Document:
Product Page

Authors / Institution:
PEAT GmbH (Berlin-based AI startup)

Year of Publication:
2024

Summary / Abstract:
Plantix uses computer vision and deep learning to diagnose plant diseases, pest infestations, and nutrient deficiencies from smartphone images. Farmers upload a photo of a symptomatic leaf, and an AI model trained on millions of labeled images returns a diagnosis and recommended treatment (e.g., specific fungicide or organic alternative). In India pilot regions, Plantix users report a 30% reduction in crop losses due to early detection. In Europe (Germany, Spain), the app's integration with local agrochemical suppliers has shortened time-to-treatment by 45% and reduced unnecessary pesticide applications by 25%. PEAT claims over 10 million downloads globally and partnerships with national extension services in India and Brazil.

Keywords: *Crop diagnosis; pesticide reduction; mobile ML; extension services*

Link to Full Document:
https://plantix.net/

Title of the Paper:
Solinftec Solix: Autonomous Field Robot for Weed and Pest Management

Type of Document:
Product Page

Authors / Institution:
Solinftec (Brazil; serving Europe)

Year of Publication:
2023

Summary / Abstract:
Solix is a lightweight AI-driven robot equipped with high-resolution cameras and multispectral sensors. In European trials (France, Netherlands), it autonomously traverses crop rows to identify weeds (98% detection accuracy) and pests—applying micro-doses of herbicide or targeted insecticide only where needed. Results show an average herbicide reduction of 85% and a 20% increase in crop-stand uniformity. Subscription pricing (€/ha) allows mid-sized farms to access robotic weeding without large CAPEX. Farmers report 30% lower labor expenses and improved ROI within two seasons. Firmware updates push new crop models (e.g., beets, lettuce) mapped via transfer learning.

Keywords: *Autonomous robot; multispectral imaging; precision spraying; subscription model*

Link to Full Document:
https://en.wikipedia.org/wiki/Solinftec

Title of the Paper:
Muzzle-Based Cattle Identification System Using AI

Type of Document:
Research Paper

Authors / Institution:
Hasan Z. Islam; Safayet Khan; Sanjib K. Paul; Sheikh I. Rahi; Fahim H. S. Sifat; Md. M. H. S. Sany; Md. S. A. Sarker; Tareq A. Anam; I. H. Polas

Year of Publication:
2024

Summary / Abstract:
The authors develop a computer-vision system to identify individual cattle by their unique muzzle patterns—akin to human fingerprints. Using over 32,000 high-resolution muzzle images from 826 cattle in Bangladesh, they train a YOLO detector to locate muzzles and a FaceNet-based embedding network for identification. The system achieves 96.49% accuracy and a 97.33% F_1-score, enabling tamper-proof tracking of livestock. In pilot deployment on a mid-sized Bangladeshi dairy farm, insurance claim processing time dropped by 70% due to reliable animal identification. The authors argue that this technology can prevent fraud, streamline breeding records, and support precision feeding programs by automatically logging individual intake.

Keywords: *Cattle ID; computer vision; YOLO; FaceNet; livestock insurance*

Link to Full Document:
https://arxiv.org/abs/2407.06096

DOI: 10.48550/arXiv.2407.06096

Title of the Paper:
AI Literacy Programs in Europe – Supporting Article 4 of the EU AI Act

Type of Document:
Catalogue

Authors / Institution:
EU AI Act Platform

Year of Publication:
2025

Summary / Abstract:
As organisations across Europe navigate the implementation of the EU AI Act — including Article 4, which addresses the importance of AI literacy — there is growing interest in accessible and practical training resources. This document presents a non-exhaustive selection of AI literacy programs that may be useful for companies, institutions, and professionals seeking to better understand AI technologies, their risks, and their responsible use in the workplace.

Keywords: *AI literacy, EU AI Act, training programs, responsible AI use, workforce education*

Link to Full Document:
https://artificialintelligenceact.eu/ai-literacy-programs/

Title of the Paper:
Artificial Intelligence at the Edge

Type of Document:
Product Page

Authors / Institution:
Danube Dynamics

Year of Publication:
N/A

Summary / Abstract:
Artificial Intelligence at the Edge refers to deploying AI algorithms directly on local devices (like sensors, controllers, or embedded systems) rather than relying on cloud-based servers. This enables real-time data processing and decision-making close to where the data is generated. It reduces latency, which is critical for time-sensitive industrial applications. Edge AI also enhances data privacy and security by minimizing the need to transmit sensitive information over networks. It lowers bandwidth usage and operational costs by avoiding constant cloud communication. Additionally, it improves system reliability, as decisions can still be made even if network connectivity is lost.

Keywords: *Edge Computing, Real-Time Decision Making, Embedded AI*

Link to Full Document:
https://www.danube-dynamics.at/en/skills/artificial-intelligence/

Title of the Paper:
Material Application with Robotic Assistance.

Type of Document:
Product Page

Authors / Institution:
Profactor

Year of Publication:
N/A

Summary / Abstract:
Small, flexible robots in combination with camera-based recognition systems represent an efficient and economical alternative, even in changing manufacturing situations and production with many variants. As a result, employees can be relieved of monotonous tasks and can devote themselves to more important tasks. At the same time, manufacturing quality can be improved, regardless of whether painting, oiling, gluing or coating is involved.

Keywords: *Automation in wood, metal & plastics processin. AI assistance, Quality control*

Link to Full Document:
https://www.profactor.at/loesungen/robotik-und-automation/material-auftragen-mit-robotischer-assistenz/

Title of the Paper:
Projekt opt1mus

Type of Document:
Project / Project deliverable

Authors / Institution:
RISC

Year of Publication:
N/A

Summary / Abstract:
The OPT1MUS project ("Open Process Twin Minding the User 1st") is a 36-month initiative (March 2023–February 2026) funded by the Austrian Research Promotion Agency (FFG) and led by RISC Software GmbH in collaboration with several partners (LKR, HPI, AIT) to develop a holistic cyber-physical system (CPS) for the light metals industry, especially aluminium production. The goal is to deploy digital twins of production equipment combined with live measurement data and artificial intelligence to optimise casting and forming processes, reduce experimental trials, minimise scrap, lower CO_2 emissions and adapt flexibly to new alloys and processes. Key benefits include improved operational efficiency, resource/scarcity resilience, higher product quality and safer working environments. The software developed will be released as open-source and tailored for adaptation beyond continuous casting.

Keywords: *Cyber-Physical Systems (CPS), Process Optimization, Emission Reduction*

Link to Full Document:
https://www.risc-software.at/en/referenceprojects/opt1mus/

CHAPTER III. Research and Innovation

The Research and Innovation category gathers academic studies, research reports, pilot initiatives, and technological assessments that deepen understanding of AI capabilities and applications. These materials explore the technical foundations of AI, emerging methodologies, performance evaluations, and experimental results across multiple sectors such as healthcare, manufacturing, agriculture, and environmental sustainability. They highlight scientific progress, innovation trends, and the shifting boundaries between AI theory and real-world implementation.

This category is especially valuable for understanding the technological drivers behind AI adoption. The documents outline data requirements, machine learning methods, performance metrics, and implementation challenges that researchers and practitioners must consider. They also explore interdisciplinary themes, such as AI ethics, AI safety, explainability, and human–machine interaction. Many of the publications present comparative analyses, international benchmarking, or cross-sector insights, offering readers a broader contextual understanding of the global AI landscape.

By assembling these research-oriented sources in one place, the E-Library empowers users to stay informed about the latest scientific knowledge and innovation pathways. It supports the BrAIn project's capacity-building goals by connecting policy discussions with practical evidence from ongoing research efforts. Ultimately, this category enables stakeholders to develop strategies and decisions rooted in scientific insights and real-world data.

Title of the Paper:
Joint analysis of the regional innovation ecosystems

Type of Document:
Project / Project deliverable

Authors / Institution:
BrAIn project

Year of Publication:
2024

Summary / Abstract:
This report integrates the findings of 10 region/country innovation ecosystems analysis prepared by the BrAIn project partners. This is the first project deliverable (D1.1.1) and it presents a comprehensive analysis of the innovation ecosystems across BrAIn partner countries. The objective of the regional analysis is to identify the right sets of skills needed by SMEs for enabling the application of AI-driven processes, concentrating on the 3 pre-defined sectors (agro food, manufacturing and health-care), taking into account the horizontal challenges (energy efficiency, labour force and value chain). The deliverable is highlighting key findings, challenges, and strategic recommendations to foster innovation and economic growth.

Keywords: *territorial cooperation; Danube Region; transnational partnerships; smarter Europe; greener low-carbon Danube; social inclusion; governance; research & innovation; advanced technologies; digitalisation; circular economy; climate change adaptation; environmental risk management; water & biodiversity; labour markets; education & lifelong learning; culture & sustainable tourism; institutional capacities; macro-regional governance.*

Link to Full Document:
https://interreg-danube.eu/storage/media/01J32W0E72RB8S0R2ZD5PPK3S0.pdf

Title of the Paper:
Robotics and AI as Enablers for Greener Dismantling, Remanufacturing and Recycling

Type of Document:
Project / Project deliverable

Authors / Institution:
CORDIS database

Year of Publication:
2025

Summary / Abstract:

In recent years, the European circular economy is being shaped, presenting new opportunities and challenges in terms of materials reusing, waste processing, remanufacturing and refurbishing of products. Processing products after their (first) life requires high level of flexibility which is attributed to the different part conditions and variability. The EU-funded ROB4GREEN project will develop user-friendly, collaborative, AI-driven robotic systems capable of adapting to various R-strategies for processing products after their (first) lifecycle. These systems will enhance existing robot skills and generate new ones while operating autonomously. The ROB4GREEN solution will be validated at scale in major industries, showcasing optimisation ranging from the "cell" level to the whole "value chain", thereby contributing to the goals of the European Green Deal.

Keywords: *robotics, artificial intelligence (AI), circular economy, remanufacturing, dismantling, recycling, value-chain optimisation, collaborative robots, adaptive systems, industrial sustainability.*

Link to Full Document:
https://cordis.europa.eu/project/id/101189665

Title of the Paper:
Advances in Agriculture Robotics: A State-of-the-Art Review and Challenges Ahead

Type of Document:
Research Paper

Authors / Institution:
Oliveira, L. F. P., Moreira, A. P., & Silva, M.

Year of Publication:
2021

Summary / Abstract:
The constant advances in agricultural robotics aim to overcome the challenges imposed by population growth, accelerated urbanization, high competitiveness of high-quality products, environmental preservation and a lack of qualified labor. In this sense, this review paper surveys the main existing applications of agricultural robotic systems for the execution of land preparation before planting, sowing, planting, plant treatment, harvesting, yield estimation and phenotyping. In general, all robots were evaluated according to the following criteria: its locomotion system, what is the final application, if it has sensors, robotic arm and/or computer vision algorithm, what is its development stage and which country and continent they belong. After evaluating all similar characteristics, to expose the research trends, common pitfalls and the characteristics that hinder commercial development, and discover which countries are investing into Research and Development (R&D) in these technologies for the future, four major areas that need future research work for enhancing the state of the art in smart agriculture were highlighted: locomotion systems, sensors, computer vision algorithms and communication technologies. The results of this research suggest that the investment in agricultural robotic systems allows to achieve short—harvest monitoring—and long-term objectives—yield estimation.

Keywords: *Cyber-Physical Systems (CPS), Process Optimization, Emission Reduction*

Link to Full Document:

DOI: https://doi.org/10.3390/robotics10020052

Title of the Paper:
Top 4 Traits of Companies Leading in AI Governance

Type of Document:
Study

Authors / Institution:
Responsible AI Institute

Year of Publication:
2025

Summary / Abstract:
The article "Top 4 Traits of Companies Leading in AI Governance" by the Responsible AI Institute explores how leading organisations integrate AI governance into their core business strategy rather than treating it as a compliance exercise. It identifies four key traits: embedding AI governance as a central business function, establishing clear accountability throughout the AI lifecycle, designing for trust by ensuring fairness and transparency in model development, and collaborating with external experts, industry groups, and standards bodies. Companies exhibiting these traits are better positioned to scale AI responsibly, manage operational and reputational risks, and build stakeholder trust. By treating governance as a strategic advantage, they can navigate regulatory complexities more effectively, foster innovation safely, and gain a competitive edge in a rapidly evolving AI landscape.

Keywords: *AI governance; business-function integration; accountability; trust by design; external collaboration; fairness; transparency; risk management; executive oversight; responsible AI; scalable AI.*

Link to Full Document:
https://www.responsible.ai/top-4-traits-of-companies-leading-in-ai-governance/

Title of the Paper:
2022 Digital Twin Global Servey Report

Type of Document:
Report

Authors / Institution:
Altair

Year of Publication:
2022

Summary / Abstract:
The Altair Engineering 2022 Global Digital Twin Survey Report presents findings from an international survey of over 2,000 professionals across 10 countries, aiming to map the current understanding, adoption, usage, and business impact of digital twin technology. The report shows that 69% of respondents say their organisations currently use digital twin technology, and among non-users, 58% expect to adopt it within the next one to two years. It also reveals that 92% of users believe digital twins have made their products or processes more sustainable, and 43% expect digital twins to render physical testing obsolete within the next four years. The survey further highlights key challenges: 54% of respondents say they either have limited knowledge of digital twin technology or find its definition confusing. There are also notable gaps between organisational leadership and user-level staff: 64% of executives feel "highly knowledgeable" about digital twins, versus only 35% of user-level respondents. The data suggests that although adoption is growing rapidly, organisations still face internal alignment, definitional clarity, and capability development issues to fully realise the technology's promise.

Keywords: *digital twin; global survey; technology adoption; business impact; sustainability; real-time monitoring; cost savings; organisational knowledge gap; executive vs user perception; digital transformation.*

Link to Full Document:
https://altair.com/docs/default-source/pdfs/altair_dt-global-survey-report_web.pdf?sfvrsn=b5aceaa9_28

Title of the Paper:
Automated Machine Learning for Industrial Applications - Challenges and Opportunities

Type of Document:
Research Paper

Authors / Institution:
Florian Bachinger, Jan Zenisek

Year of Publication:
2024

Summary / Abstract:
In this work, we identify challenges of automated ML in industrial applications, encountered in cooperations with our company partners. We highlight opportunities for industry that arise through the application of automated ML pipelines with integrated prior knowledge, that facilitate a high level of trust in the model's predictive performance without the need for manual validation. Recent advances in ML allow for the integration of prior knowledge in the ML training phase. We identify this development as a crucial prerequisite for automated ML workflows to reduce the strain on domain experts. The integration of prior knowledge increases trust in ML predictive models, as they are guaranteed to adhere to certain pre-defined behavior. Therefore, predictive models, created by such ML algorithms, do not require domain experts for e.g., manual model validation.

Keywords: *MLOps, Automated Machine Learning, Expert Knowledge Integration, Shape-Constraints, Industrial Machine Learning*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S1877050924001698?via%3Dihub

DOI: https://doi.org/10.1016/j.procs.2024.01.168

Title of the Paper:
Machine learning based outcome prediction of microsurgically treated unruptured intracranial aneurysms

Type of Document:
Research Paper

Authors / Institution:
Nico Stroh, Harald Stefanits, Alexander Maletzky, Sophie Kaltenleithner, Stefan Thumfart, Michael Giretzlehner, Richard Drexler, Franz L. Ricklefs, Lasse Dührsen, Stefan Aspalter, Philip Rauch, Andreas Gruber & Matthias Gmeiner

Year of Publication:
2023

Summary / Abstract:
Machine learning (ML) has revolutionized data processing in recent years. This study presents the results of the first prediction models based on a long-term monocentric data registry of patients with microsurgically treated unruptured intracranial aneurysms (UIAs) using a temporal train-test split. Temporal train-test splits allow to simulate prospective validation, and therefore provide more accurate estimations of a model's predictive quality when applied to future patients. The present results showed good performance in predicting functional and clinical outcomes after microsurgical therapy of UIAs in the internal data set, especially for the main outcome parameters, mRS and permanent neurological deficit.

Keywords: *Machine Learning (ML), Unruptured Intracranial Aneurysms (UIAs), Quadratic Discriminant Analysis (QDA), Modified Rankin Scale (mRS)*

Link to Full Document:
https://www.nature.com/articles/s41598-023-50012-8

DOI: https://doi.org/10.1038/s41598-023-50012-8

Title of the Paper:
Simulation-assisted Training of Neural Networks for Condition Monitoring of Electrical Drives: Approach and Proof of Concept

Type of Document:
Research Paper

Authors / Institution:
Edmund Marth, Patrick Zorn, Florian Schmid, Shahed Masoudian, Khaled Koutini, and Wolfgang Amrhein

Year of Publication:
2022

Summary / Abstract:
One crucial aspect of data based modeling is the availability of a sufficient amount of proper data. In the context of AI systems used for condition monitoring of electrical drives, to predict certain faulty conditions, also the corresponding faulty real world data has to be provided to teach an AI based condition monitoring system. But this is most likely linked to an enormous effort. In this paper an approach is presented, how such a condition monitoring system can be created by mainly using simulation data and mapping the simulation domain to the real world domain using fault-free measurements, which are usually easily accessible. After presenting the concept of simulation assisted training, prediction of a commutation angle error of a block-commutated 280W motor will serve to prove the concept.

Keywords: *Artificial Neural Network (NN), Convolutional Neural Network (CNN), Condition Monitoring (CM), Mechatronic*

Link to Full Document:
https://ieeexplore.ieee.org/document/10025982

Title of the Paper:
Data-driven prediction of possible quality deterioration in injection molding processes

Type of Document:
Reseach Paper

Authors / Institution:
Edwin Lughofer, Kurt Pichler

Year of Publication:
2024

Summary / Abstract:
We propose an approach for the automated prediction of quality deteriorations in injection molding machines using data-driven models. This method relies on data recorded during regular production, avoiding the need to collect data from anomalous phases, perform manual annotation cycles, or know specific fault modes in advance. Our approach includes two main concepts: establishing causal relations between process variables to serve as online residual generators, and analyzing multi-variate residual signals using advanced independent component analysis. This analysis acts as a control signal for potential anomalies without needing parameters for online analysis. The second concept involves direct prediction of quality criteria using an optical inspection system. Time series-based trends of process data are used to create quality prediction models, which can be updated automatically with new measurements. To handle higher dynamics, a dynamic lazy learning (dLL) approach combined with partial least squares is used, updating the reference database and establishing local models for new queries.

Keywords: *Injection Molding, Dynamic Lazy Learning (dLL), Anomaly detection, Independent Component Analysis (ICA), Fuzzy Systems Training(FuzzyGen)*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S1568494623010475?via%3Dihub

DOI: https://doi.org/10.1016/j.asoc.2023.111029

Title of the Paper:
Towards an Automated Process for Adaptive Modelling of Orthoses and Shoe Insoles in Additive Manufacturing

Type of Document:
Research Paper

Authors / Institution:
Gerald A. Zwettler, Martin Trixner, Clemens Schartmüller, Sophie Bauernfeind, Thomas Stockinger and Christoph Praschl

Year of Publication:
2023

Summary / Abstract:
Although orthopedics is becoming increasingly important as a medical domain, especially in emerging countries, the level of automation is still marginal and hardly any Industry 4.0 paradigms have been implemented. In this scientific work, solution concepts for holistic process automation in orthopedics are introduced so that prosthetic covers and orthoses for different body regions can be automated by using AI and evaluated with sensor networks. In this process, body scan models are adapted to the conditions of the anatomy or prosthesis models, so that stability as well as fitting accuracy are given in comparison with the other half of the body. Automation in the field of orthopedics leads not only to a significant reduction in costs but can also help to close the research gap regarding objectifiability of results. The first partial aspects have already been successfully implemented for leg prostheses, arm prostheses and shoe insoles with the aid of machine learning processes and physical models for elastic form fitting. As soon as the overall process has been realized, the applicability will be validated in the following year of the project by means of clinical studies and evaluated by utilizing sensor networks for pressure and temperature measurements

Keywords: *Orthoses modelling, ML in manufacturing, sensor grids, computer-aided therapy, 3D printing*

Link to Full Document:
https://www.cal-tek.eu/proceedings/i3m/2023/iwish/005/

DOI: 10.46354/i3m.2023.iwish.005

Title of the Paper:
Reconstructionless Airborne Radiance Fields

Type of Document:
Research Paper

Authors / Institution:
Christoph Praschl, Leopold Böss, David C. Schedl

Year of Publication:
2024

Summary / Abstract:
Advancements in computer graphics, particularly through Neural Radiance Fields (NeRF), have transformed novel-view synthesis. Methods like Instant-NGP, Mip-NeRF 360, Gaussian Splatting, and SMERF offer unprecedented realism and flexibility in rendering complex scenes. However, NeRF-like models face significant challenges, requiring high-quality, multi-view scene captures and detailed camera parameters. Some techniques also need a partially reconstructed sparse model of the scene. To address these challenges and maximize NeRF's potential, we introduce a novel processing pipeline. This pipeline uses image and sensor data from uncrewed aerial vehicles (UAVs) to train NeRF-like models, bypassing the need for computationally costly SfM. Our work advances the integration of NeRF technologies into various applications, especially aerial imaging.

Keywords: *Neural Radiance Fields (NeRF), Novel-View Synthesis, Instant-NGP, Structure from Motion (SfM), Uncrewed Aerial Vehicles (UAVs), Camera Poses, Aerial Imaging Applications*

Link to Full Document:
https://dl.acm.org/doi/10.1145/3641234.3671077

DOI: https://doi.org/10.1145/3641234.3671077

Title of the Paper:
Towards an Automated Process for Adaptive Modelling of Orthoses and Shoe Insoles in Additive Manufacturing

Type of Document:
Research Paper

Authors / Institution:
Christoph Praschl and David C. Schedl

Year of Publication:
2023

Summary / Abstract:
Climate change poses a grave threat to habitats such as forests, endangering the integrity and biodiversity of the global flora and fauna. Accurate surveying techniques are crucial tomodel populations, detect over and under populations, and address them accordingly. This work proposes a process for creating a biodiversitymodel of a forest's fauna using uncrewed aerial vehicles equipped with RGB and thermal cameras. Real-world data, combined with computer-generated imagery and artificial intelligencemodels, will allow training suitable computer visionmodels. Thesemodels will serve as a reliable and objective data source, enabling the creation of statistical models to describe themonitored forests' conditions and the biodiversity of its fauna.

Keywords: *Biodivercity, Uncrewed Aerial Vehicles (UAVs), Computer Vision, AI based Approaches, Airborne Light-Field Sampling (ALFS), Digital Elevation Model (DEM)*

Link to Full Document:
https://www.cal-tek.eu/proceedings/i3m/2023/sesde/002/

DOI: https://doi.org/10.46354/i3m.2023.sesde.002

Title of the Paper:
Development of Artificial Intelligence in Serbia. Serbia as the Regional Leader

Type of Document:
Research Paper

Authors / Institution:
Stefan R. Badža

Year of Publication:
2024

Summary / Abstract:
Artificial intelligence (AI) is transforming industries and social spheres, and Serbia has come forward as the leader in Southeast Europe. By adopting the National Strategy for Artificial Intelligence in 2019 and founding the Institute for Artificial Intelligence in 2021, Serbia laid strong foundations for the development of this technology. The introduction of AI in the educational system, the development of the research infrastructure and active participation in international initiatives have contributed to important results. Ethnical guidelines adopted in 2023 constitute the basis for accountable AI application. Being elected Chair of the Global Partnership on Artificial Intelligence for 2024 further confirms Serbia's position. Continued support of the Government, educational institutions and the economic sector is crucial for the future development of AI technologies.

Keywords: *Artificial intelligence, Serbia, National Strategy, Institute for Artificial Intelligence, Ethical Guidelines, international initiatives*

Link to Full Document:
https://fondacijasnd.rs/wp-content/uploads/2024/09/01-Stefan-Badza-engleski.pdf

DOI: 10.5937/napredak5-52537

Title of the Paper:
Traffic Noise Assessment in Urban Bulgaria Using Explainable Machine Learning

Type of Document:
Research Paper

Authors / Institution:
Marco Helbic, Julian Hagenauer, Angel Burov, Angel M. Dzhambov

Year of Publication:
2025

Summary / Abstract:
The paper explores how advanced supervised machine-learning models can be used to create fine-grained noise maps across Bulgaria's five largest cities. The authors collected real-world A-weighted equivalent continuous sound levels from 232 fixed-site monitors and then used predictors related to transport (major roads, footways, residential roads) and land-use (number of buildings within buffer zones) to train models like XGBoost. They applied SHAP (Shapley additive explanation) values to interpret which features most strongly influenced noise estimates. Their results show that the vast majority—96.8%—of the urban population in these cities is exposed to harmful noise levels, highlighting significant spatial variation in noise and the potential of machine learning to improve environmental noise assessment.

Keywords: *traffic noise; urban pollution; Bulgaria; machine learning; noise mapping; explainable AI; XGBoost; SHAP values; land-use regression; environmental exposure; sound level monitoring.*

Link to Full Document:
https://arxiv.org/abs/2501.14437

Title of the Paper:
Enhancing Trust in eAssessment - the TeSLA System Solution

Type of Document:
Research Paper

Authors / Institution:
Malinka Ivanova, Sushil Bhattacharjee, Sebastien Marcel, Anna Rozeva, Mariana Durcheva

Year of Publication:
2019

Summary / Abstract:
The paper titled "Enhancing Trust in eAssessment – the TeSLA System Solution" explores how to improve trust in online assessments by using biometric verification and authorship-detection technologies. The research is part of the TeSLA project under Horizon 2020 and involves large-scale pilot tests at institutions such as Technical University of Sofia. It presents both the technical architecture of the TeSLA system—designed to authenticate student identity and authorship—and the results of surveys of students and teachers to assess trust perceptions and user acceptance. The paper finds that implementing a comprehensive model for identity and authorship verification in e-assessment scenarios can substantially enhance users' confidence in the integrity of online testing. It details how biometric authentication tools, monitoring of authorship claims and fraud detection modules were integrated into the broader e-assessment workflow, and discusses technical, ethical and usability challenges encountered during deployment.

Keywords: *eAssessment; online education; student authentication; authorship verification; biometric verification; fraud detection; trust in assessment; TeSLA system; Horizon 2020; online testing integrity.*

Link to Full Document:
https://arxiv.org/abs/1905.04985

Title of the Paper:
DuoSearch: A Novel Search Engine for Bulgarian Historical Documents

Type of Document:
Research Paper

Authors / Institution:
Angel Beshirov, Suzan Hadzhieva, Ivan Koychev, Milena Dobreva

Year of Publication:
2023

Summary / Abstract:
The paper presents a proof-of-concept search engine designed specifically for digitised historical document collections in Bulgarian. The authors address two major challenges: the high rate of errors from optical character recognition (OCR) and the orthographic variation stemming from Bulgarian language reforms between the 1850s and 1940s. The system combines a neural-network-based text-correction module, a morphological-lexical resource for older Bulgarian orthography, and a search architecture built on Elasticsearch to enable effective querying over error-prone and variable historical text. The results show that incorporating orthographic normalisation and error correction improves recall and retrieval accuracy compared to baseline search setups. The paper highlights how archival institutions and digital libraries can benefit from tailored information-retrieval systems when working with historic-language and noisy-OCR corpora, and points toward future work in multilingual adaptation and large-scale deployment.

Keywords: *historical documents; search engine; Bulgarian language; OCR error correction; orthographic variation; Elasticsearch; neural network; digitised archives; information retrieval; heritage digital libraries.*

Link to Full Document:
https://arxiv.org/abs/2305.19392

Title of the Paper:
BgGPT: The First Open Large Language Model for Bulgarian

Type of Document:
Project / Project deliverable

Authors / Institution:
INSAIT (Institute for Computer Science, Artificial Intelligence and Technology)

Year of Publication:
2024

Summary / Abstract:
BgGPT is Bulgaria's first open-source large language model (LLM) tailored for the Bulgarian language. Developed by INSAIT, it aims to foster AI adoption across public and private sectors. The model, trained on over 3 billion Bulgarian sentences and comprising 7 billion parameters, is released under the permissive Apache 2.0 license, allowing free use and commercialization. BgGPT supports applications in education, business, healthcare, and public administration, positioning Bulgaria as a leader in AI within the Central and Eastern European region.

Keywords: *Bulgarian language model; large-language model (LLM); open source AI; national AI infrastructure; data sovereignty; public sector AI; commercial license; education technology; digital public goods; INSAIT.*

Link to Full Document:
https://insait.ai/insait-announced-bggpt/

Title of the Paper:
Energy oriented multi cutting parameter optimization in face milling

Type of Document:
Research Paper

Authors / Institution:
P. Albertelli, A. Keshari, A. Matta

Year of Publication:
2016

Summary / Abstract:
A new model for evaluating the energy consumed by a machine tool for processing a prismatic workpiece was developed. The model takes into account the energy absorbed by different machine components such as the auxiliary systems, the axes, the axes chiller, the tool change system, chip conveyor and the spindle system. The relationships between the power absorption of each considered machine component and the main cutting parameters were adequately modeled. The cutting energy was also taken into consideration. Since the wear of the tool was included in the model, the energy absorbed by the machine during passive phases (e.g. tool changes) was also evaluated. Each machine component model was opportunely configured according to the considered production phase. Some of the parameters of the machine tool energy model were identified through experimental tests performed on a real machining center equipped with linear motors. A multivariable energy optimization was carried out considering the cutting speed, the feed and the radial depth of cut as the main parameters. The energy minimization was performed through exhaustive enumeration methods. Results were properly discussed and analyzed. The optimization analysis was also repeated emulating various machine tool configurations and different production scenarios.

Keywords: *CNC milling, energy consumption, cutting parameters, tool wear, optimization, face milling, manufacturing efficiency, machining modeling*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652616302724

DOI: https://doi.org/10.1016/j.jclepro.2016.04.012

Title of the Paper:
A Simulated Annealing-Based Multiobjective Optimization Algorithm: AMOSA

Type of Document:
Research Paper

Authors / Institution:
S. Bandyopadhyay, S. Saha, U. Maulik, K. Deb

Year of Publication:
2008

Summary / Abstract:
This paper describes a simulated annealing based multiobjective optimization algorithm that incorporates the concept of archive in order to provide a set of tradeoff solutions for the problem under consideration. To determine the acceptance probability of a new solution vis-a-vis the current solution, an elaborate procedure is followed that takes into account the domination status of the new solution with the current solution, as well as those in the archive. A measure of the amount of domination between two solutions is also used for this purpose. A complexity analysis of the proposed algorithm is provided. An extensive comparative study of the proposed algorithm with two other existing and well-known multiobjective evolutionary algorithms (MOEAs) demonstrate the effectiveness of the former with respect to five existing performance measures, and several test problems of varying degrees of difficulty. In particular, the proposed algorithm is found to be significantly superior for many objective test problems (e.g., 4, 5, 10, and 15 objective problems), while recent studies have indicated that the Pareto ranking-based MOEAs perform poorly for such problems. In a part of the investigation, comparison of the real-coded version of the proposed algorithm is conducted with a very recent multiobjective simulated annealing algorithm, where the performance of the former is found to be generally superior to that of the latter.

Keywords: *Simulated annealing, multiobjective optimization, AMOSA, Pareto dominance, evolutionary computation, archive, clustering, convergence*

Link to Full Document:
https://ieeexplore.ieee.org/document/4358775

DOI: https://doi.org/10.1109/TEVC.2007.900837

Title of the Paper:
Optimization of cutting parameters for minimizing power consumption and maximizing tool life

Type of Document:
Reserach Paper

Authors / Institution:
Bhushan, R. K.

Year of Publication:
2013

Summary / Abstract:
Reducing energy consumption in machining metal matrix composites (MMC) can enhance manufacturing sustainability. This study investigates CNC turning of 7075 Al alloy reinforced with 15 wt% SiC (20–40 μm), examining the effects of cutting speed, feed rate, depth of cut, and nose radius. Using response surface methodology (RSM) and desirability function analysis, multi-response optimization was performed to minimize power consumption and maximize tool life. Analysis of variance identified the most significant parameters, and confirmation tests validated the results. Optimized parameters reduced power consumption by 13.55% and increased tool life by 22.12%, demonstrating that this approach effectively improves machining efficiency and sustainability.

Keywords: *Cutting parameters, power consumption, tool life, aluminum alloy composites*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652612004155

DOI: https://doi.org/10.1016/j.jclepro.2012.08.008

Title of the Paper:
Optimization of energy consumption response parameters for turning operation using Taguchi method

Type of Document:
Research Paper

Authors / Institution:
Bilga, P.S.; Singh, S.; Kumar, R.

Year of Publication:
2016

Summary / Abstract:
Improving the environmental performance of machining can be achieved by reducing energy consumption. This study optimizes key energy parameters—energy efficiency (EE), active energy consumed by the machine (AECM), and power factor (PF)—during CNC rough turning of EN 353 alloy steel with multi-layer coated tungsten carbide inserts. Using Taguchi L27 design and MINITAB analysis, optimal settings were identified, improving EE by 61.78%, AECM by 57.03%, and PF by 7.49%. Depth of cut most affects EE and PF, while feed rate dominates AECM; nose radius and interactions have minimal impact.

Keywords: *Taguchi method, energy consumption, turning operation*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652616311258

DOI: https://doi.org/10.1016/j.jclepro.2016.07.220

Title of the Paper:
Optimization of process parameters using a Response Surface Method for minimizing power consumption in the milling of carbon steel

Type of Document:
Project Research

Authors / Institution:
Campatelli, G.; Lorenzini, L.; Scippa, A.

Year of Publication:
2014

Summary / Abstract:
Due to the urgent need for global reductions of environmental impacts, many studies have been carried out in different fields. One of the most important sectors is manufacturing, particularly due to the high power consumption of the production machines of manufacturing plants. This paper focuses on the efficiency of the machining centres and provides an experimental approach to evaluate and optimize the process parameters in order to minimize the power consumption in a milling process performed on a modern CNC machine. The parameters evaluated are the cutting speed, the axial and radial depth of cut, and the feed rate. A lubrication strategy has been chosen based on previous studies: all the tests have been carried out using dry lubrication in order to eliminate the environmental impact due to lubricant without substantially affecting the energy consumption. The process has been analyzed using a Response Surface Method in order to obtain a model fit for the fine tuning of the process parameters.

Keywords: *Response Surface Method, power consumption, milling, carbon steel*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S095965261300704X

DOI: https://doi.org/10.1016/j.jclepro.2013.10.025

Title of the Paper:
Optimization of cutting parameters using Response Surface Method for minimizing energy consumption and maximizing cutting quality in turning of AISI 6061 T6 aluminum

Type of Document:
Research Paper

Authors / Institution:
Camposeco-Negrete, C.

Year of Publication:
2015

Summary / Abstract:
Modern machining faces the challenge of reducing environmental impacts from high energy consumption. This study optimizes rough turning of AISI 6061 T6 aluminum to minimize energy use and surface roughness while maximizing material removal rate. Using Central Composite Design, Response Surface Method, and desirability analysis, feed rate and depth of cut were identified as key factors. Optimized parameters reduced energy consumption by 14.41% and surface roughness by 360.47%, improving both sustainability and process quality.

Keywords: *Cutting parameters, energy consumption, cutting quality, turning, aluminum*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652614013067

DOI: https://doi.org/10.1016/j.jclepro.2014.12.017

Title of the Paper:

Optimization of cutting parameters to minimize energy consumption during turning of AISI 1018 steel at constant material removal rate using robust design

Type of Document:

Research Paper

Authors / Institution:

Camposeco-Negrete, C.; Najera, J. D. D. C.; Miranda-Valenzuela, J. C.

Year of Publication:

2016

Summary / Abstract:

Machine tools have an impact on the environment due to their energy consumption. New strategies with focus on the reduction of the energy consumed by manufacturing processes have received significant attention owing to the rise of the electricity costs. This paper presents an experi- mental study related to the optimization of cutting parame- ters in turning of AISI 1018 steel. The aim of the study was to minimize the quantity of electrical energy required by the machine tool in order to perform the cutting operation. The material removal rate was set to a constant value in all the experimental trials so as to analyze the effect that the cutting parameters have on the energy consumed. Robust Design was used to determine the effects of the depth of cut, feed rate, and cutting speed on the energy required by the ma- chine tool, considering two sources of noise in the experi- mental trials. The results of this work show that the tech- niques covered by the concept of Robust Design can be used to minimize the energy consumed and variation of the ma- chining process.

Keywords: *Cutting parameters, energy consumption, robust design, turning, AISI 1018 steel*

Link to Full Document:

https://www.researchgate.net/publication/281775601_Optimization_of_cutting_parameters_to_minimize_energy_consumption_during_turning_of_AISI_1018_steel_at_constant_material_removal_rate_using_robust_design

Title of the Paper:
Optimization of cutting parameters for minimizing energy consumption in turning of AISI 6061 T6 using Taguchi methodology and ANOVA

Type of Document:
Reserach Paper

Authors / Institution:
Camposeco-Negrete, C.

Year of Publication:
2013

Summary / Abstract:
This study optimizes cutting parameters during rough turning of AISI 6061 T6 to minimize energy consumption and surface roughness. Using orthogonal arrays, S/N ratios, and ANOVA, feed rate, depth of cut, and cutting speed were analyzed. Feed rate was the most significant factor, though its optimal level differs for energy versus surface quality, with higher feed reducing energy but increasing roughness.

Keywords: *Cutting parameters, energy consumption, Taguchi method, ANOVA, turning, aluminum*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S095965261300187X

DOI: https://doi.org/10.1016/j.jclepro.2013.03.049

Title of the Paper:
Concept Description for CECIMO's Self-regulatory Initiative (SRI) for the Sector Specific Implementation of the Directive 2005/32/EC

Type of Document:
Report

Authors / Institution:
CECIMO

Year of Publication:
2009

Summary / Abstract:
Describes CECIMO's initiative for implementing Directive 2005/32/EC in the machine tool manufacturing sector.

Keywords: *Self-regulatory initiative, CECIMO, Directive 2005/32/EC, machine tools*

Link to Full Document:
https://www.energimyndigheten.se/Global/F%C3%B6retag/SRI_MachineTools_091016%20%282%29.pdf

Title of the Paper:
Analysis of cutting parameters and cooling/lubrication methods for sustainable machining in turning of Haynes 25 superalloy

Type of Document:
Research Paper

Authors / Institution:
Sarıkaya, M.; Yılmaz, V.; Güllü, A.

Year of Publication:
2016

Summary / Abstract:
This study evaluates machining of cobalt-based Haynes 25 superalloy under dry, conventional, and Minimum Quantity Lubrication (MQL) methods. Using CNC turning with varied cutting speeds and feed rates, tool wear and surface roughness were measured. Results show that high-pressure MQL reduces oil use while improving machinability, with low speeds causing poor surface finish and high speeds increasing tool wear.

Keywords: *Cutting parameters, cooling, lubrication, sustainable machining, Haynes 25, turning*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652616305947

DOI: https://doi.org/10.1016/j.jclepro.2016.05.122

Title of the Paper:
C-PSA: Constrained Pareto simulated annealing for constrained multi-objective optimization

Type of Document:
Research Paper

Authors / Institution:
Singh, H. K.; Ray, T.; Smith, W.

Year of Publication:
2010

Summary / Abstract:
In recent years, evolutionary algorithms (EAs) have been extensively developed and utilized to solve multi-objective optimization problems. However, some previous studies have shown that for certain problems, an approach which allows for non-greedy or uphill moves (unlike EAs), can be more beneficial. One such approach is simulated annealing (SA). SA is a proven heuristic for solving numerical optimization problems. But owing to its point-to-point nature of search, limited efforts has been made to explore its potential for solving multi-objective problems. The focus of the presented work is to develop a simulated annealing algorithm for constrained multi-objective problems. The performance of the proposed algorithm is reported on a number of difficult constrained benchmark problems. A comparison with other established multi-objective optimization algorithms, such as infeasibility driven evolutionary algorithm (IDEA), Non-dominated sorting genetic algorithm II (NSGA-II) and multi-objective Scatter search II (MOSS-II) has been included to highlight the benefits of the proposed approach.

Keywords: *Simulated annealing, multi-objective optimization, constrained optimization, C-PSA*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0020025510001337

DOI: https://doi.org/10.1016/j.ins.2010.03.021

Title of the Paper:
Feature-based process planning for environmentally conscious machining: Part 1: microplanning

Type of Document:
Research Paper

Authors / Institution:
Srinivasan, M.; Sheng, P.

Year of Publication:
1999

Summary / Abstract:

Process planning in environmentally conscious machining involves a multi-objective analysis of manufacturing dimensions that include production rate, quality, process energy and mass of waste streams generated by the process. While there has been a body of work developed in life cycle analysis, one of the critical issues limiting environmental analyses is the material and geometric complexity of engineered components. In this paper a formalized approach towards integrating environmental factors in process planning is presented, which incrementally evaluates part designs through an aggregation of features. Process planning is divided into two phases, micro and macroplanning. In microplanning, process, parameters, tooling and cutting fluids are selected for the individual features, while in macroplanning interactions between features are examined. Microplanning is the focus of this paper where predictive process models are used to obtain process level inventory of process energy, machining time, mass of waste streams (primary scrap and secondary catalysts) and quality parameters. The mass of waste streams are then evaluated for their environmental impact based on a health hazard scoring index. The Microplanning algorithm integrates these dimensions in an optimization framework to make robust process planning decisions at the feature level. A case study of a machined part is presented to illustrate the microplanning methodology.

Keywords: *Feature-based planning, microplanning, sustainable machining, environmentally conscious manufacturing*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0736584599000174

DOI: https://doi.org/10.1016/S0736-5845(99)00017-4

Title of the Paper:
Feature based process planning in environmentally conscious machining - Part 2: Macroplanning

Type of Document:
Rsearch Paper

Authors / Institution:
Srinivasan, M.; Sheng, P.

Year of Publication:
1999

Summary / Abstract:
A second aspect of integrating environmental factors into manufacturing process planning is macroplanning, where the inter-relationships between features are accounted for. While micro-planning results in a process plan which is the aggregation of feature-level optimal plans, the aggregation of microplans does not necessarily result in a globally feasible process plan for a given part. Macro-planning issues which have significant environmental impact include process sequence selection for intersecting or nested features and feature clustering based on common setups and catalysts (tools and cutting fluids). These macro-planning issues influence both batch-level routing and scheduling decisions in a job shop and resource allocation, line balancing and facility planning decisions in a transfer line. Building upon the feature-level optimization presented in Part 1, case studies of feature interactions will be presented and an overall sequencing algorithm will be outlined. Both the micro and macro-planning schemes are integrated with a solid modeling environment to serve as a platform for analyzing incremental component design changes.

Keywords: *Macroplanning, process planning, sustainable machining, environmentally conscious manufacturing*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0736584599000186

DOI: https://doi.org/10.1016/S0736-5845(99)00018-6

Title of the Paper:
Sustainable machining: selection of optimum turning conditions based on minimum energy considerations

Type of Document:
Research Paper

Authors / Institution:
Rajemi, M. F.; Mativenga, P. T.; Aramcharoen, A.

Year of Publication:
2010

Summary / Abstract:
The aim of the work reported in this paper was to develop a new model and methodology for optimising the energy footprint for a machined product. The total energy of machining a component by the turning process was modelled and optimised to derive an economic tool-life that satisfies the minimum energy footprint requirement. The work clearly identifies critical parameters in minimising energy use and hence reducing the energy cost and environmental footprint. Additionally, the paper explores and discusses the conflict and synergy between economical and environmental considerations as well as the effect of system boundaries in determining optimum machining conditions.

Keywords: *Sustainable machining, turning, energy consumption, optimization*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652610000363

DOI: https://doi.org/10.1016/j.jclepro.2010.01.025

Title of the Paper:
Annual Energy Outlook 2015

Type of Document:
Report

Authors / Institution:
U.S. Energy Information Administration

Year of Publication:
2015

Summary / Abstract:
The report projects U.S. energy markets through 2040 under multiple scenarios including reference, low/high economic growth, and low/high oil price cases. In the reference scenario, modest growth in energy demand is driven by efficiency gains and slow economic growth, while domestic oil and natural gas production rises sharply — leading to a decline in net energy imports and eventual U.S. self-sufficiency. Renewables increase their share in electricity generation, and energy-related CO_2 emissions stabilize or decline despite economic growth. The report also outlines that future crude-oil prices remain relatively moderate in the reference case but vary widely across cases.

Keywords: *Energy outlook, U.S. energy policy, projections, EIA, consumption trends*

Link to Full Document:
http://www.eia.gov/forecasts/archive/aeo15/pdf/0383(2015).pdf

Title of the Paper:
Empirical models for specific energy consumption and optimization of cutting parameters for minimizing energy consumption during turning

Type of Document:
Reserach Paper

Authors / Institution:
Velchev, S.; Kolev, I.; Ivanov, K.; Gechevski, S.

Year of Publication:
2014

Summary / Abstract:
The article presents approach for optimization of cutting parameters for minimizing direct energy consumption during turning. Presented are the results of the experimental studies of the dependence of the specific energy consumption by material removal rate (MRR) when turning of steel using CNC lathes and an improved empirical model of this dependence. This model is used for the formulation of a model of direct energy consumption expressed by the cutting parameters. An equation for the optimal cutting speed is devised by applying the minimum energy criterion. The influences of the insert grade, of the feed and depth of cut on the minimum energy consumption have been found through numerical research. Recommendations for their selection have been made based on considerations for minimum energy during turning.

Keywords: *Energy consumption, empirical models, optimization, turning, cutting parameters*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0959652614005903

DOI: https://doi.org/10.1016/j.jclepro.2014.05.099

Title of the Paper:
Multi-agent system for distributed computer-aided process planning problem in e-manufacturing environment

Type of Document:
Research Paper

Authors / Institution:
Agrawal, R., et al.

Year of Publication:
2009

Summary / Abstract:
This paper deals with the multi-agent system for distributed computer-aided process planning problem. The proposed architecture consists of three autonomous agents (Global Manager Agent, Design Agent, and Optimization Agent) capable of communicating to each other through eXtensible Markup Language (XML). In contrast to the traditional process planning model, a new paradigm incorporating fixture cost has been conceptualized. Optimization agent is facilitated by the virtues of DNA computing and identifies the optimal/near optimal process plan with the help of available resources. Furthermore, in order to investigate the efficacy of the developed architecture, the manufacturing of a prismatic part having 23 operations has been simulated and solved accordingly. Results obtained reveal the superiority of the proposed architecture.

Keywords: *Multi-agent system, distributed process planning, CAPP, e-manufacturing*

Link to Full Document:
https://www.academia.edu/27551410/Multi_agent_system_for_distributed_computer_aided_process_planning_problem_in_e_manufacturing_environment

DOI: https://doi.org/10.1007/S00170-008-1844-3

Title of the Paper:
A system for optimising cutting parameters when planning milling operations in high-speed machining

Type of Document:
Research Paper

Authors / Institution:
Alberti, M.; Ciurana, J.; Casadesus, M.

Year of Publication:
2005

Summary / Abstract:
A key aspect of computer-aided process planning (CAPP) is selecting the manufacturing route for metal removal. This paper addresses this issue for high-speed machining, where cutting parameter decisions are typically experience-based. We propose a system to optimize parameter selection in milling and high-speed milling, minimizing operation costs while considering all machining constraints. Using group technology, representative parts were evaluated, and results compared with reference manuals to identify factor relationships affecting high-speed milling. Our method supports optimal parameter selection, reducing processing times and ensuring high-quality finishes in both conventional and high-speed milling.

Keywords: *Cutting parameters, milling, high-speed machining, optimization*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0924013604012361

DOI: https://doi.org/10.1016/j.jmatprotec.2004.09.092

Title of the Paper:
The application of STEP-NC using agent-based process planning

Type of Document:
Research Paper

Authors / Institution:
Allen, R.D.; Harding, J.A.; Newman, S.T.

Year of Publication:
2005

Summary / Abstract:
Computer-aided part programming is information-intensive and well-suited for AI, knowledge-based systems, and agent technologies. Intelligent agents can autonomously and cooperatively make decisions, making them ideal for future process planning systems. With the emerging ISO 14649 (STEP-NC) standard replacing ISO 6983, operations are defined at a higher level as Workingsteps rather than tool movements, enabling optimized tool trajectories and bi-directional CAD/CAM feedback. This paper presents a STEP-NC compliant multi-agent system where agents represent component features and collaboratively generate process plans, demonstrated through case studies evaluating feature interactions.

Keywords: *STEP-NC, agent-based planning, process planning, integration*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/00207540412331314406

DOI: https://doi.org/10.1080/00207540412331314406

Title of the Paper:
Computer aided process planning: the state-of-the-art survey

Type of Document:
Study

Authors / Institution:
Alting, L.; Zhang, H.

Year of Publication:
1989

Summary / Abstract:
Computer-Aided Process Planning (CAPP) is a key component of Computer Integrated Manufacturing (CIM), yet its industrial benefits remain limited. This paper reviews the history, current techniques, and implementation approaches of CAPP, including AI, GT technology, and programming methods. Fourteen well-known systems are briefly described, while a comprehensive appendix lists 156 existing CAPP systems with their features and specifications. Future trends, such as integration, AI applications, and software migration, are discussed to guide research and implementation.

Keywords: *CAPP, computer-aided process planning, survey, manufacturing*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/00207548908942569

DOI: https://doi.org/10.1080/00207548908942569

Title of the Paper:
A system for the design and manufacture of feature-based parts through the Internet

Type of Document:
Research Paper

Authors / Institution:
Alvares, A.J.; Ferreira, J.C.E.

Year of Publication:
2008

Summary / Abstract:
Computer-Aided Process Planning (CAPP) is a crucial part of Computer Integrated Manufacturing, though its industrial impact is still evolving. This paper reviews the history, current techniques, and implementation approaches, including AI, GT technology, and programming methods. Fourteen notable CAPP systems are highlighted, and an appendix lists 156 existing systems with their features. Future trends such as integration, AI applications, and software migration are discussed to guide research and practical implementation.

Keywords: *Web-based design, feature-based parts, remote manufacturing, CAPP*

Link to Full Document:
https://www.researchgate.net/publication/225397734_A_system_for_the_design_and_manufacture_of_feature-based_parts_through_the_Internet

DOI: https://doi.org/10.1007/s00170-006-0743-8

Title of the Paper:
An integrated web-based CAD/CAPP/CAM system for the remote design and manufacture of feature-based cylindrical parts

Type of Document:
Research Paper

Authors / Institution:
Alvares, A.J.; Ferreira, J.C.E.; Lorenzo, R.M.

Year of Publication:
2008

Summary / Abstract:
This paper presents WebMachining, an integrated web-based CAD/CAPP/CAM system for remote design and manufacture of feature-based cylindrical parts. It integrates collaborative design (WebCADbyFeatures), generative process planning (WebCAPP), and manufacturing (WebTurning). Design features are mapped to machining features, generating nonlinear process plans using a STEP-NC-like structure. The WebTurning module enables remote CNC turning via a client–server setup. Examples illustrate the complete remote workflow from design to production.

Keywords: *CAD, CAPP, CAM, web-based system, cylindrical parts*

Link to Full Document:
https://www.researchgate.net/publication/225626510_An_integrated_web-based_CADCAPPCAM_system_for_the_remote_design_and_manufacture_of_feature-based_cylindrical_parts

DOI: https://doi.org/10.1007/s10845-008-0117-1

Title of the Paper:
STEP-based feature modeller for computer-aided process planning

Type of Document:
Rsearch Paper

Authors / Institution:
Amaitik, S.M.; Kilic, S.E.

Year of Publication:
2005

Summary / Abstract:
Feature-based modeling is key for integrating CAD/CAPP systems, as it captures geometric, topological, and process-related information like tolerances and material properties. This paper presents STEP-FM, a STEP-based feature modeller for prismatic parts, using high-level 3D solid features. The design process involves selecting the base shape, adding or removing features, and specifying attributes such as size, position, and tolerances. Parts are exported in STEP XML format for seamless CAPP/CAM integration, and an object-oriented approach ensures reusability and incremental development. An example demonstrates the modeller's application.

Keywords: *STEP, feature modelling, CAPP, process planning*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/00207540500104019

DOI: https://doi.org/10.1080/00207540500104019

Title of the Paper:
An intelligent process planning system for prismatic parts using STEP features

Type of Document:
Rsearch Paper

Authors / Institution:
Amaitik, S.M.; Kilic, S.E.

Year of Publication:
2007

Summary / Abstract:
This paper presents an intelligent process planning system using STEP features (ST-FeatCAPP) for prismatic parts. The system maps a STEP AP224 XML data file, without using a complex feature recognition process, and produces the corresponding machining operations to generate the process plan and corresponding STEP-NC in XML format. It carries out several stages of process planning such as operations selection, tool selection, machining parameters determination, machine tools selection and setup planning. A hybrid approach of most recent techniques (neural networks, fuzzy logic and rule-based) of artificial intelligence is used as the inference engine of the developed system. An object-oriented approach is used in the definition and implementation of the system. An example part is tested and the corresponding process plan is presented to demonstrate and verify the proposed CAPP system. The paper thus suggests a new feature-based intelligent CAPP system for avoiding complex feature recognition and knowledge acquisition problems.

Keywords: *CAPP, prismatic parts, intelligent system, STEP features*

Link to Full Document:
https://www.researchgate.net/publication/225107159_An_intelligent_process_planning_system_for_prismatic_parts_using_STEP_features

DOI: https://doi.org/10.1007/s00170-005-0269-5

Title of the Paper:
IPPA: a knowledge assisted process planning system

Type of Document:
Research Paper

Authors / Institution:
Anwer, N.; Chep, A.

Year of Publication:
1999

Summary / Abstract:
The present survey is intended to give a comprehensive picture of the actual knowledge 1n the field of computer-aided process planning systems. In a first part, a methodic analysis of the process planning function 1s carried out on the basis of a typical example. Possible areas of computer utilization are identified and problems in computer Introduction are analyzed. In a second part, a systematic review of typical existing systems is performed with an effort to classify systems according to their basic characteristics. Some examples of interesting outputs obtained with the help of computer-aided process planning are reviewed in more details.

Keywords: *Knowledge-based planning, IPPA, CAPP, process planning*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0007850607601760

DOI: https://doi.org/10.1016/S0007-8506(07)60176-0

Title of the Paper:
Selection of cutting tools and conditions of machining operations using an expert system

Type of Document:
Rsearch Paper

Authors / Institution:
Arezoo, B.; Ridgway, K.; Al-Ahmari, A.M.A.

Year of Publication:
2000

Summary / Abstract:
This paper presents the development of a knowledge-based system for selection of cutting tools and conditions of turning operations. The system developed can be used to select the toolholder, insert and cutting conditions (feed, speed and depth of cut). It is able to analyse and optimise cutting tools and condition selection. In addition, the user or tool supplier is able to modify and enhance the system to meet their individual requirements. This system is constructed and implemented using Prolog. It contains an inference engine, a user interface and explanation facility (a complete shell), a knowledge base, and an optimisation model for machining conditions. The inputs to the system developed are the part and tool files, which include the representation of the part features and cutting tools. This paper describes the application of the system developed using a typical example.

Keywords: *Expert system, tool selection, machining conditions, manufacturing*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0166361599000512

DOI: https://doi.org/10.1016/S0166-3615(99)00051-2

Title of the Paper:
Flexible tool selection decision support system for milling operations

Type of Document:
Research Paper

Authors / Institution:
Carpenter, I.D.; Maropoulos, P.G.

Year of Publication:
2000

Summary / Abstract:
Competitive cutting tool manufacturers face growing demands for expert tool selection and cutting data. This paper presents OPTIMUM, a computer-based system for automated machinability assessment and tool selection in milling. It uses rule-based logic and regression techniques to determine feasible cutting conditions, handling imprecise workpiece data. The system considers over 750 materials and nearly 36,000 tool combinations, applying an optimisation criterion called "harshness" and a post-processor to produce optimised tool sets. By combining knowledge-based and statistical methods, OPTIMUM provides flexible and reliable support for milling process planning.

Keywords: *Tool selection, milling, decision support system, flexible system*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S092401360000707X#!

DOI: https://doi.org/10.1016/S0924-0136(00)00707-X

Title of the Paper:
An IT view on perspectives of computer aided process planning research

Type of Document:
Study

Authors / Institution:
Cay, F.; Chassapis, C.

Year of Publication:
1997

Summary / Abstract:
This paper presents current research perspectives on Computer Aided Process Planning (CAPP) and it covers articles and other related publications that appeared especially in the last seven years. It aims to provide a clear understanding of the directions and challenges in the field. The current research efforts on CAPP systems focus on both variant as well as generative and hybrid systems. A majority of these systems apply expert system or artificial intelligence-based techniques. At the same time a strong emphasis is placed on integrating CAPP and its related activities into one system. As a bridge between Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) CAPP relies on good interfaces between these systems. Automatic feature recognition systems can be used to interface CAD and CAPP. Various methods are available to perform feature recognition using solid model of the part. This paper first provides a general introduction to CAPP along with its background. It also gives an overview of manufacturing features and feature recognition research. Recent CAPP research and systems are discussed in terms of their general characteristics. Finally, shortcomings of current systems and expected future developments are considered.

Keywords: *CAPP, process planning, IT perspectives, review*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0166361597000705

DOI: https://doi.org/10.1016/S0166-3615(97)00070-5

Title of the Paper:
A model for integrating process planning and production planning and control in machining processes

Type of Document:
Research Paper

Authors / Institution:
Ciurana, J., et al.

Year of Publication:
2008

Summary / Abstract:
The goal of process planning is to propose the routing of a previously designed part and results in a sequence of operations and their parameters. It concerns and requires detailed information about the process. The goal of production planning, on the other hand, is to schedule, sequence and launch the orders introduced on the routing sheet into the job-shop according to the enterprise's strategic goal and the actual conditions of the production plant. The goals, information and decisions taken in process planning and production planning and control are often very different and, because of that, it is very difficult to integrate them. The objective of this work is to develop a model that can be applied in the future to the development of an integrated process planning and scheduling tool using an integrated definition (IDEF) methodology to design an activity model, which integrates process and production planning in metal removal processes. An activity model will be used to develop a system that allows the user to plan the process and the production at the same time in collaborative engineering work. To design the activity model, a wide range of parts were evaluated and processed in an actual job-shop factory. Several activities were developed in detail to be tested in real cases, and an example of one of them is introduced in this article.

Keywords: *Process planning, production control, machining, integration model*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0736584507000658

DOI: https://doi.org/10.1016/j.rcim.2007.07.013

Title of the Paper:
A framework for extending computer aided process planning to include business activities and CAD/CAM data retrieval

Type of Document:
Rsearch Paper

Authors / Institution:
Culler, D.E.; Burd, W.

Year of Publication:
2007

Summary / Abstract:
CAPP systems have struggled to integrate business and manufacturing functions due to incompatible proprietary software. Smaller manufacturers still rely on manual methods, highlighting the need for reconfigurable systems combining CAD/CAM, intelligent machining, and product data management. This research demonstrates an architecture integrating customer service, CAPP, and activity-based costing (ABC) into a single system, enabling companies to track costs and resource use. Developed through a university–industry collaboration, the system improves decision-making, standardizes transactions, and preserves knowledge for process analysis and industry growth.

Keywords: *CAPP, business integration, CAD/CAM, data retrieval*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S073658450600024X

DOI: https://doi.org/10.1016/j.rcim.2006.02.005

Title of the Paper:
A psycho-clonal-algorithm-based approach to the solve operation sequencing problem in a CAPP environment

Type of Document:
Research Paper

Authors / Institution:
Dashora, Y.; Tiwari, M.K.; Karunakaran, K.P.

Year of Publication:
2008

Summary / Abstract:
Pertaining to the intricacies involved in the formulation of an optimal process planning system, operation sequencing has been recognized as a complex and crucial task to be accomplished. The operation sequencing problem determines the preferred order to perform a set of selected operations that satisfies the precedence constraints along with the satisfaction of the optimization goals. In general, the problem is characterized by its combinatorial nature and complex precedence relations that make it computationally complex. A psycho-clonal-algorithm-based approach has been proposed in this paper to solve optimally the operation sequencing problem. The objective function has been made more comprehensive for the parts types of varying complexities. This approach is an extension of the artificial immune system (AIS) approach and inherits its characteristics from the Maslow's need hierarchy theory related to psychology. The various need levels present in the algorithm help in maintaining the viability of solution, whereas the path towards optima is revealed by the trait of affinity maturation. Effectiveness of the algorithm is authenticated by solving the problems of varying complexities cited in the literature and comparing its performance with other established metaheuristic approaches.

Keywords: *Operation sequencing, CAPP, psycho-clonal algorithm, manufacturing planning*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/09511920601079355

DOI: https://doi.org/10.1080/09511920601079355

Title of the Paper:
A stochastic concept for the optimization of manufacturing tolerances in computer aided process plan simulation

Type of Document:
Research Paper

Authors / Institution:
Hamou, S., et al.

Year of Publication:
2006

Summary / Abstract:
In order to integrate tolerance synthesis for manufacturing dimensions in CAPP systems, an automated process plan simulation module has previously been developed. This module permits the verification of the manufacturing pre-projects and the optimization of the manufacturing dimensions. The module used an optimization procedure which was realized through an equal distribution of the excess tolerance which is that of the design functional requirement. However in reality, this distribution should take into account the stochastic aspects of the dispersions and the complexity or cost of the manufacturing dimensions. In the present work, in order to overcome these drawbacks, a statistical and cost based tolerance synthesis model has been developed. It is shown that this model performs an objective and global distribution of the residual (excess) tolerances of the design functional dimensions on all the manufacturing dimensions of the process plan. The dispersions method is used in the modelling process to determine the variables of the objective function and to automatically extract the manufacturing tolerance chains. These chains are then used to construct the functional constraints of the optimization model. The whole process has been programmed as an automated tolerancing tool for manufacture and validated for several examples.

Keywords: *Tolerance optimization, stochastic models, CAPP, simulation*

Link to Full Document:
https://www.researchgate.net/publication/220381827_A_stochastic_concept_for_the_optimization_of_manufacturing_tolerances_in_computer_aided_process_plan_simulation

DOI: 10.1080/09511920500174588

Title of the Paper:
Manufacturable feature recognition and its integration with process planning

Type of Document:
Research Paper

Authors / Institution:
Han, J.; Han, I.

Year of Publication:
1999

Summary / Abstract:
The paper presents an integrated framework to recognise manufacturable features from CAD models and directly use them to generate process-planning decisions (machining sequence, setups) via dependency modelling. By doing so it addresses a longstanding gap between CAD feature recognition and manufacturing process planning, offering a more unified path towards automated CAPP systems.

Keywords: *Feature recognition, process planning, CAD integration, manufacturability*

Link to Full Document:
https://dl.acm.org/doi/pdf/10.1145/304012.304023

Title of the Paper:
Neural computation of decisions in optimization Problems

Type of Document:
Research Paper

Authors / Institution:
Hopfield, J.J.; Tank, D.W.

Year of Publication:
1985

Summary / Abstract:
Highly-interconnected networks of nonlinear analog neurons are shown to be extremely effective in computing. The networks can rapidly provide a collectively-computed solution (a digital output) to a problem on the basis of analog input information. The problems to be solved must be formulated in terms of desired optima, often subject to constraints. The general principles involved in constructing networks to solve specific problems are discussed. Results of computer simulations of a network designed to solve a difficult but well-defined optimization problem--the Traveling-Salesman Problem--are presented and used to illustrate the computational power of the networks. Good solutions to this problem are collectively computed within an elapsed time of only a few neural time constants. The effectiveness of the computation involves both the nonlinear analog response of the neurons and the large connectivity among them. Dedicated networks of biological or microelectronic neurons could provide the computational capabilities described for a wide class of problems having combinatorial complexity. The power and speed naturally displayed by such collective networks may contribute to the effectiveness of biological information processing.

Keywords: *Neural networks, optimization, decision computation, biological models*

Link to Full Document:
https://www.researchgate.net/publication/19135224_Neural_Computation_of_Decisions_in_Optimization_Problems

DOI: 10.1007/BF00339943

Title of the Paper:
Run-time interpretation of STEP-NC: implementation and performance

Type of Document:
Research Paper

Authors / Institution:
Kramer, T.R., et al.

Year of Publication:
2006

Summary / Abstract:
This paper describes an experiment in building and running two STEP-NC interpreters for milling operations: one using ISO 14649, the other using AP 238 of ISO 10303. Both use STEP part 21 exchange files as input and call low-level machine control functions. Both include tool path generators and have sufficient functionality to execute the first example program at the end of part 11 of ISO 14649. The objectives and results were: (1) to determine if ISO 14649 and AP 238 contain sufficient information to run a machining centre (yes); (2) to determine whether AP 238 faithfully remodels the information in ISO 14649 for the functionality that was implemented (yes); (3) to determine whether real-time interpretation of STEP-NC is feasible (yes); (4) to determine the burden on systems programmers to build a STEP-NC interpreter (heavy); (5) to determine how interpretation time varies with file size (linearly for both interpreters); and (6) to compare the speed with which the two formats can be interpreted. Using currently available software tools, ISO 14649 can be interpreted significantly faster, but both interpreters are so fast that interpretation time is negligible compared with running time.

Keywords: *STEP-NC, real-time interpretation, performance, manufacturing*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/09511920600622056

DOI: https://doi.org/10.1080/09511920600622056

Title of the Paper:
Object-oriented analysis and design of computer aided process planning systems

Type of Document:
Research Paper

Authors / Institution:
Law, H.W.; Tam, H.Y.

Year of Publication:
2000

Summary / Abstract:
Computer aided process planning (CAPP) systems in the real world are usually large and complex. The creation of a correct analysis and model of a CAPP system before implementation is a crucial step in the successful generation and operation of computer-integrated systems for today's highly competitive and dynamic environment. Few reports describe a rigorous approach to the object-oriented analysis and design of such systems. This paper presents an object-oriented analysis and design strategy for CAPP systems. It then illustrates in detail how such a strategy can be carried out in a specific domain for process planning: The printed circuitboard (PCB) industry. The studyis believed to be one of the pioneer efforts in CAPP systems analysis and design using the object-oriented approach. The authors' experience justifies the use of the object-oriented approach to create a CAPP system, as the resultant model can be used almost as a direct mapping during implementation.

Keywords: *Object-oriented design, CAPP, process planning, software engineering*

Link to Full Document:
https://www.tandfonline.com/doi/abs/10.1080/095119200130045

DOI: https://doi.org/10.1080/095119200130045

Title of the Paper:
Universal manufacturing platform for CNC manufacture

Type of Document:
Research Paper

Authors / Institution:
Newman, S.T.; Nassehi, A.

Year of Publication:
2007

Summary / Abstract:
Today, CNC technology is a major contributor to the production capacity of industrial companies. The current NC standards only allow rudimentary low-bandwidth information transfer between various resources. A complex network of post-processors is therefore needed for the basic functionality of CAD/CAM/CNC systems. In this paper, the authors investigate and design a universal platform for supporting CNC manufacturing. The platform shifts the necessary knowledge transformations from the vendor specific software domain to the conceptual model space. This will eliminate the requirement for postprocessors. Consequently, resources will be interchangeable and interoperable, adding to the strategic agility of the manufacturing network.

Keywords: *Universal platform, CNC, manufacturing systems, interoperability*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0007850607001114

DOI: https://doi.org/10.1016/j.cirp.2007.05.110

Title of the Paper:
Machine tool capability profile for intelligent process planning

Type of Document:
Research Paper

Authors / Institution:
Newman, S.T.; Nassehi, A.

Year of Publication:
2009

Summary / Abstract:
An optimized metal cutting process plan can only be developed with an accurate capability profile of a machine tool. Based on the information within this profile, a manufacturing decision making process can ascertain the time and production cost of parts. In this paper, a standardized methodology for modelling manufacturing resources is realized to enable accurate representation of actual resources and custom constraints. An example case study demonstrates the application of the machine tool capability profile through the selection of available cutting tools rather than using nominal cutting tools.

Keywords: *Machine tool capability, intelligent planning, CNC, process automation*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S0007850609001115

DOI: https://doi.org/10.1016/j.cirp.2009.03.031

Title of the Paper:
Energy efficient process planning for CNC machining

Type of Document:
Research Paper

Authors / Institution:
Newman, S.T.; Nassehi, A.; Imani-Asrai, R.

Year of Publication:
2010

Summary / Abstract:
Machining is one of the major activities in manufacturing industries and is responsible for a significant portion of the total consumed energy in this sector. Performing machining processes with better energy efficiency will, therefore, significantly reduce the total industrial consumption of energy. In this paper, a framework is presented to validate the introduction of energy consumption in the objectives of process planning for CNC machining. The state of the art in process planning and energy consumption in manufacturing research is utilised as a basis for the framework. A mathematical representation of the logic used is presented followed by two sets of experiments on energy consumption in machining to validate the logic. It is shown that energy consumption can be added to multi-criteria process planning systems as a valid objective and the discussion on using resource models for energy consumption estimation concludes the paper. These experiments represent a part test procedure machining proposal for the new environmental machine standard ISO 14955 Part 3.

Keywords: *Energy efficiency, CNC, process planning, sustainable manufacturing*

Link to Full Document:
https://www.sciencedirect.com/science/article/abs/pii/S1755581712000223

DOI: https://doi.org/10.1016/j.cirpj.2012.03.007

Title of the Paper:
Broad Adoption of AI by SMEs in the Agriculture and Farming Sector

Type of Document:
Report

Authors / Institution:
Global Partnership on Artificial Intelligence (GPAI), Co-leads: Canada and Netherlands

Year of Publication:
2023

Summary / Abstract:
This report (2023–2024) outlines efforts to accelerate AI uptake by small and medium-sized enterprises in agriculture. It synthesizes lessons from pilot deployments of AI tools for yield prediction, pest detection, and supply-chain optimization across 12 participating SMEs. Key findings include: (1) sensor integration lowers uncertainties in crop management, (2) open-source ML models can be adapted regionally, and (3) capacity-building remains a bottleneck. The document also recommends establishing AI "testbeds" in collaboration with research institutes to validate solutions under real-world conditions.

Keywords: *AI adoption; SMEs; yield prediction; pest detection; testbeds*

Link to Full Document:
https://gpai.ai/projects/innovation-and-commercialisation/GPAI%20IC%20Agro%20Project%20-%20Resume%20of%202023%20Activities%20and%202024%20Outlook%20VF.pdf

Title of the Paper:
AgroTech: Report on the State of Digital Innovation in European Agriculture

Type of Document:
Report

Authors / Institution:
EIT Digital (in partnership with European Commission's Digital Innovation Hubs)

Year of Publication:
2024

Summary / Abstract:
Published September 2024, this report examines digital innovation across EU agriculture. It covers 85 case studies of AI-driven robotics, data-analytics platforms, and precision-farming pilots funded under Horizon Europe and the Digital Europe Programme. Sections include: (1) autonomous field robots for weeding and harvesting, (2) ML-based irrigation scheduling systems, (3) blockchain-backed traceability for high-value crops. The report identifies key challenges: interoperability of sensors, farmer digital literacy, and scaling prototype solutions to commercially viable models. It concludes with policy recommendations to reinforce "Digital Innovation Hubs" and foster cross-border knowledge sharing.

Keywords: *Digital innovation; robotics; precision farming; interoperability; traceability*

Link to Full Document:
https://www.eitdigital.eu/fileadmin/2024/ecosystem/downloads/EIT-Digital_AgriTech-Report-web.pdf

Title of the Paper:
agrifoodTEF: EU-Wide Platform to Accelerate Agritech Adoption

Type of Document:
Project / Project deliverable

Authors / Institution:
agrifoodTEF consortium (led by Wageningen University & Research; funded under Horizon Europe)

Year of Publication:
2024

Summary / Abstract:
Launched in late 2023 (first outputs published 2024), agrifoodTEF is a €60 million initiative to connect agritech startups, research centres, and pilot farms across the EU. It provides funding, mentorship, and shared "sandbox" environments for testing AI-powered robotics (e.g., autonomous harvesters, drone-based spraying systems) and data-analytics tools (e.g., ML models for yield forecasting). The platform also runs "Innovation Sprints" where interdisciplinary teams co-develop solutions over 3 months. Early achievements include two proof-of-concept pilots in Spain (vineyard yield optimization) and Poland (automated berry sorting).

Keywords: *AI-powered robotics; data analytics; sandbox; innovation sprint*

Link to Full Document:
https://agrifoodtef.eu/news/european-agritech-companies-harness-power-artificial-farming-business-eu-funds-new-cutting

Title of the Paper:
AgroXAI: Explainable AI-Driven Crop Recommendation System for Agriculture 4.0

Type of Document:
Research Paper

Authors / Institution:
Özlem Turgut; İbrahim Kök; Suat Özdemir

Year of Publication:
2024

Summary / Abstract:
AgroXAI proposes an edge-computing framework incorporating IoT sensors (soil moisture, temperature) and explainable ML (SHAP, LIME, ELI5) to recommend regionally appropriate crops. It operates offline at the farm level and provides: (1) local explanations—why a specific crop suits a plot, (2) counterfactual suggestions—alternative crops if parameters change. Experiments on a Turkish agricultural dataset show ≥ 92% accuracy in matching agronomist recommendations. The paper emphasizes transparency to gain farmer trust and reduce barriers to AI adoption.

Keywords: *Explainable AI; crop recommendation; edge computing; IoT; transparency*

Link to Full Document:
https://arxiv.org/abs/2412.16196

DOI: 10.48550/arXiv.2412.16196

Title of the Paper:
Machine Learning Models for Soil Parameter Prediction Based on Satellite, Weather, Clay and Yield Data

Type of Document:
Research Paper

Authors / Institution:
Calvin Kammerlander; Viola Kolb; Marinus Luegmair; Lou Scheermann; Maximilian Schmailzl; Marco Seufert; Jiayun Zhang; Denis Dalic; Torsten Schön

Year of Publication:
2025

Summary / Abstract:
The AgroLens project (2023–2025) develops ML models to estimate soil nutrients (N, P, K, pH) using Sentinel-2 imagery, LUCAS Soil data, weather forecasts, and localized yield records. They benchmark Random Forests, XGBoost, and fully connected neural nets. The European model achieves RMSE ≤ 0.12 for soil-nutrient levels on hold-out LUCAS samples. Extensions incorporate "Clay AI" embeddings and regional transfer learning to improve predictions in sub-Saharan Africa. The paper details data preprocessing, feature-engineering steps, and a reproducible ML pipeline shared via GitHub.

Keywords: *Soil nutrient prediction; Sentinel-2; XGBoost; transfer learning; LUCAS dataset*

Link to Full Document:
https://arxiv.org/abs/2503.22276

DOI: 10.48550/arXiv.2503.22276

Title of the Paper:
AgriBench: A Hierarchical Agriculture Benchmark for Multimodal Large Language Models

Type of Document:
Research Paper

Authors / Institution:
Yutong Zhou; Masahiro Ryo

Year of Publication:
2024

Summary / Abstract:
AgriBench introduces the first multimodal agriculture benchmark to evaluate Large Language Models (LLMs) on: (1) processing field images (RGB, segmentation masks, depth maps), (2) understanding agronomic metadata (geolocation, land-cover taxonomy, quality scores). Built on the LUCAS dataset, AgriBench contains 1,784 image–annotation pairs spanning 27 EU regions. Baselines with vision–language LLMs achieve 68.4% accuracy on land-use classification tasks. The authors argue this benchmark will drive specialized "Agri-LLMs" for tasks like crop-health assessment, yield forecasting, and land-management advice.

Keywords: *Multimodal LLM; benchmark; LUCAS; land-use classification; vision–language*

Link to Full Document:
https://arxiv.org/abs/2412.00465

DOI: 10.48550/arXiv.2412.00465

Title of the Paper:
How AI Can Help the Food Sector to Meet New Deforestation Rules

Type of Document:
Study

Authors / Institution:
Thomson Reuters Sustainability Desk (Rupert Abraham)

Year of Publication:
2024

Summary / Abstract:
This article examines how AI techniques—satellite imagery analysis, geolocation tracking, and ML-driven risk scoring—enable agribusinesses to comply with the EU Deforestation Regulation (EUDR). Platforms like TRACT integrate multispectral satellite feeds to flag deforestation risks in soy, palm oil, and cattle supply chains. Companies such as Unilever and Nestlé pilot these tools to demonstrate "no-deforestation" verification. The piece underscores the role of AI in automating vast area monitoring, reducing manual inspections by ~ 60%, and notes investor-facing dashboards (e.g., Forest IQ) that use AI to score corporate portfolios on deforestation exposure.

Keywords: *Deforestation; satellite imagery; supply-chain traceability; risk scoring; compliance*

Link to Full Document:
https://www.reuters.com/sustainability/land-use-biodiversity/how-ai-can-help-food-sector-meet-new-deforestation-rules-2024-10-24/

Title of the Paper:
Acceptance of artifcial intelligence in German agriculture: an application of the technology acceptance model and the theory of planned behavior

Type of Document:
Study

Authors / Institution:
Svenja Mohr & Rainer Kühl

Year of Publication:
2021

Summary / Abstract:
The use of Artificial Intelligence (AI) in agriculture is expected to yield advantages such as savings in production resources, labor costs, and working hours as well as a reduction in soil compaction. However, the economic and ecological benefits of AI systems for agriculture can only be realized if farmers are willing to use them. This study applies the technology acceptance model (TAM) of Davis (1989) and the theory of planned behavior (TPB) of Ajzen (1991) to investigate which behavioral factors are influencing the acceptance of AI in agriculture. The composite model is extended by two additional factors, expectation of property rights over business data and personal innovativeness. A structural equation analysis is used to determine the importance of factors influencing the acceptance of AI systems in agriculture. For this purpose, 84 farmers were surveyed with a letter or an online questionnaire. Results show that the perceived behavioral control has the greatest influence on acceptance, followed by farmers' personal attitude towards AI systems in agriculture. The modelled relationships explain 59% of the total variance in acceptance. Several options and implications on how to increase the acceptance of AI systems in agriculture are discussed.

Keywords: *Artifcial intelligence, Structural equation model survey, Technology acceptance model, Theory of planned behavior*

Link to Full Document:

DOI: https://doi.org/10.1007/s11119-021-09814-x

Title of the Paper:
Generative artificial intelligence in the agri-food value chain - overview, potential, and research challenges

Type of Document:
Review

Authors / Institution:
Christian Krupitzer

Year of Publication:
2024

Summary / Abstract:
ChatGPT uses a so called Large Language Model (LLM) to provide textual output of analyzed data. Those LLMs are one example for Generative Artificial Intelligence (AI), which focuses on creating new content, e.g., text, images, or music, based on learned patterns. Recently, applications in the food industry and agriculture started to apply Generative AI. This mini review provides an overview about applications of Generative AI in the agri-food supply chain and discusses open research challenges, also in combination with digital twins.

Keywords: *Generative artificial intelligence, generative AI, agri-food value chain, food industry, agriculture, nutrition*

Link to Full Document:
https://www.frontiersin.org/journals/food-science-and-technology/articles/10.3389/frfst.2024.1473357/pdf

DOI: doi.org/10.3389/frfst.2024.1473357

Title of the Paper:
Conference proceedings KI4Industry AI for SMEs -- The online congress for practical entry into AI for SMEs

Type of Document:
Research Paper

Authors / Institution:
Per Olof Beckemeier , Thomas Meibert , Bernd Langer , Jan Kotschenreuthe

Year of Publication:
2021

Summary / Abstract:
The disruptions in the supply chain caused by the coronavirus are forcing companies to act faster and at shorter planning intervals, based on a broad foundation of decision-making knowledge. Companies with a higher level of digitalisation already have clear advantages over their competitors with a lower level. The digitalisation of processes enables faster action and an accelerated increase in efficiency thanks to data transparency. Data-supported production and intensive networking of the supply chain will receive a further boost; digitalisation will become a decisive factor for survival in the long term. Beyond the restart phase, the current situation will require a centrally managed, cross-functional crisis management team in many companies - with fixed routines and clear objectives.

Keywords: *Lean, Agile, Digitalisierung, Maschinendatenerfassung*

Link to Full Document:
https://arxiv.org/abs/2106.09455

DOI: https://doi.org/10.48550/arXiv.2106.09455

Title of the Paper:
Systematic investigation of Basic Data Augmentation Strategies on Histopathology Images

Type of Document:
Research Paper

Authors / Institution:
Jonas Annuscheit, Benjamin Voigt, Oliver Fischer, Patrick Baumann, Sebastian Lohmann, Christian Krumnow and Christian Herta

Year of Publication:
2021

Summary / Abstract:
Recent years have witnessed the rapid progress of deep neural networks. However, in supervised learning, the success of the models hinges on a large amount of training data. Therefore, data augmentation techniques were developed to increase the effective size of the training data. Using such techniques is especially important for domains where the amount of available data is limited. In digital pathology, data augmentation is therefore often applied to improve the performance of classifications. This work systematically investigates single data augmentation techniques on different datasets using multiple network architectures. Furthermore, it proposes guidelines on using data augmentation when training deep neural networks on histopathological data.

Keywords: *Convolutional Neural Network; Data Augmentation; Digital Pathology*

Link to Full Document:
https://arxiv.org/pdf/2112.05657

Title of the Paper:
AI in Action: Beyond Experimentation to Transform Industry

Type of Document:
Report

Authors / Institution:
World Economic Forum, Accenture

Year of Publication:
2025

Summary / Abstract:
AI is rapidly evolving, especially in areas like generative and agentic AI, with the potential to transform all knowledge-driven industries by automating complex tasks and redefining value creation. While adoption is uneven across sectors, leading industries are leveraging AI to boost productivity and decision-making. However, scaling remains a major challenge. Successful AI adoption depends on key enablers: collaborative ecosystems, trust, ethical self-governance, talent development, cybersecurity, and robust digital infrastructure. The report proposes a framework to guide responsible, impactful, and scalable AI use that advances both business and societal goals.

Keywords: *Generative AI, industry transformation, adoption enablers, responsible innovation*

Link to Full Document:
https://reports.weforum.org/docs/WEF_AI_in_Action_Beyond_Experimentation_to_Transform_Industry_2025.pdf

Title of the Paper:
Frontier Technologies in Industrial Operations: The Rise of Artificial Intelligence Agents

Type of Document:
Report

Authors / Institution:
World Economic Forum, Boston Consulting Group

Year of Publication:
2025

Summary / Abstract:
AI is advancing rapidly due to breakthroughs in data, computing, and algorithms, especially in generative and agentic AI. These technologies are transforming knowledge-based industries by enhancing decision-making, productivity, and personalization. While adoption varies by sector, scaling AI remains a challenge. The report highlights key enablers—trust, self-governance, talent, cybersecurity, ecosystems, and digital infrastructure—to ensure responsible, impactful, and scalable AI integration that benefits both business and society.

Keywords: *Generative AI, industry transformation, AI adoption, ethical governance, digital infrastructure*

Link to Full Document:
https://reports.weforum.org/docs/WEF_Frontier_Technologies_in_Industrial_Operations_2025.pdf

Title of the Paper:
The Future of AI-Enabled Health: Leading the Way

Type of Document:
Report

Authors / Institution:
World Economic Forum, Boston Consulting Group

Year of Publication:
2025

Summary / Abstract:
AI has the potential to transform healthcare by enhancing care delivery, improving efficiency, and supporting personalized medicine. However, large-scale adoption is slow due to complex technologies, misaligned leadership decisions, and low trust in fragmented governance. The World Economic Forum identifies six key transitions to unlock AI's potential, including aligning public-private efforts, prioritizing digital infrastructure, building trust, and integrating data. These shifts can help both advanced economies and low- and middle-income countries address distinct healthcare challenges and achieve impactful, equitable AI-driven health systems.

Keywords: *AI in Healthcare, adoption barriers, public-private collaboration, digital infrastructure, data integration*

Link to Full Document:
https://reports.weforum.org/docs/WEF_The_Future_of_AI_Enabled_Health_2025.pdf

Title of the Paper:
AI Adoption and Revenue Growth in European SMEs

Type of Document:
Research Paper

Authors / Institution:
Lorenzo Ardito, Raffaele Filieri, Elisabetta Raguseo and Claudio Vitari.

Year of Publication:
2024

Summary / Abstract:
The study examines how adopting Artificial Intelligence (AI) influences the revenue growth of Small and Medium-Sized Enterprises (SMEs) in Europe, using data from 11,429 firms (Flash Eurobarometer 486, 2020). Grounded in the Resource-Based View and Digital Complementary Asset literature, it finds that AI adoption positively affects SMEs' revenue growth, especially when combined with the Internet of Things (IoT) and Big Data Analytics (BDA). The results highlight that integrating these digital technologies can significantly enhance firm performance, urging SME managers to invest strategically in AI and policymakers to promote supportive digitalization policies.

Keywords: *AI, SMEs, revenue growth, IoT, big data analytics*

Link to Full Document:
https://www.emerald.com/insight/content/doi/10.1108/intr-02-2024-0195/full/html

DOI: https://doi.org/10.1108/INTR-02-2024-0195

Title of the Paper:
The new normal: The status quo of AI adoption in SMEs

Type of Document:
Research Paper

Authors / Institution:
Julia Schwaeke, Anna Peters, Dominik K. Kanbach, Sascha Kraus & Paul Jones

Year of Publication:
2024

Summary / Abstract:
The recent surge in the adoption of artificial intelligence (AI) by small and medium-sized enterprises (SMEs) has garnered significant research attention. However, the existing literature reveals a fragmented landscape that hinders our understanding of how SMEs use AI. We address this through a systematic literature review wherein we analyze 106 peer-reviewed articles on AI adoption in SMEs and categorize states and trends into eight clusters: compatibility, infrastructure, knowledge, resources, culture, competition, regulation, and ecosystem: according to the technology–organization–environment model. Our research provides valuable insights and identifies significant gaps in existing literature, notably overlooking trends identification as a pivotal driver and neglecting legal requirements. Our study clarifies AI implementation within SMEs, offering a holistic and theoretically grounded perspective to empower researchers and practitioners to facilitate more effective adoption and application of AI within the SME sector.

Keywords: *AI, SMEs, technology*

Link to Full Document:
https://www.tandfonline.com/doi/full/10.1080/00472778.2024.2379999

DOI: https://doi.org/10.1080/00472778.2024.2379999

Title of the Paper:
Predicting mechanical properties in aluminum alloys: A data-driven framework leveraging LLM-based data extraction and physics-based feature engineering

Type of Document:
Research Paper

Authors / Institution:
Lukas Pichlmann, Siamak Rafiezadeh, Manuel Hofbauer, Evans D. Ocansey, Johannes A. Österreicher

Year of Publication:
2025

Summary / Abstract:
Predicting mechanical properties of aluminum alloys is key to optimizing their industrial performance, but data-driven methods often struggle with limited datasets. We automated extraction of chemical compositions, process parameters, and mechanical properties from numerous research articles using a locally hosted Large Language Model (LLM). After data cleaning, we applied physics-based feature engineering using elemental properties and the CALPHAD approach via MatCalc. Feature selection was performed with a genetic algorithm. Our machine learning models showed promising cross-validation results on the LLM-extracted dataset, though generalizability to independent datasets remains limited. By releasing our methods as open-source, we offer a practical tool for materials science and highlight the potential of LLMs in automating scientific data extraction and physics-informed modeling.

Keywords: *Al alloys, Machine learning, CALPHAD, Large language models*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S2352492825013558

DOI: https://doi.org/10.1016/j.mtcomm.2025.112843

Title of the Paper:
AI Watch

Type of Document:
Research Paper

Authors / Institution:
Joint Research Centre

Year of Publication:
2024

Summary / Abstract:
AI Watch was established by the European Commission as a knowledge and monitoring service to observe the development, adoption and impact of artificial intelligence (AI) within Europe. It tracks multiple dimensions: industrial and research capacity in AI, national and EU-level policy initiatives, the uptake of AI technologies across sectors (including public services), and broader societal, economic and regulatory impacts of AI. Its work is conducted by the Commission's science centre Joint Research Centre (JRC) in cooperation with the Directorate-General for Communications Networks, Content and Technology (DG CONNECT). Among the outputs are reports on operational definitions of AI, taxonomies for monitoring, national AI strategy reviews, mapping of AI use in public services, and analyses of AI impacts on jobs, skills and sectors. The initiative aims not only to provide an evidence base for policymaking, but also to help Europe steer AI development in line with values such as trust, human-centredness, and industrial competitiveness.

Keywords: *Artificial Intelligence, AI monitoring, AI impact, EU AI policy, industrial AI capacity, research AI capacity, national AI strategies, public sector AI, AI taxonomy, AI definition, evidence-based policy, trustworthy AI, responsible AI, technology readiness, AI skills*

Link to Full Document:
https://ai-watch.ec.europa.eu/index_en

Title of the Paper:
AI in Manufacturing: A comprehensive Keywords and Topics Analysis

Type of Document:
Research Paper

Authors / Institution:
Sonja Strasser, Shailesh Tripathi, Manuel Brunner

Year of Publication:
2025

Summary / Abstract:
Artificial Intelligence (AI) is transforming the manufacturing sector, leading to a surge in related scholarly publications. This paper analyzes AI applications in manufacturing through a comprehensive literature review using metadata—titles, keywords, authors, and affiliations—to explore regional and thematic trends. Keywords are categorized into 11 groups, and country-specific keywords highlight distinct research focuses. Topic modeling reveals nine key themes and their distribution across countries, while clustering identifies nations with similar research interests. The findings underscore the need for interdisciplinary approaches to reflect AI's impact on manufacturing. As AI reshapes technology, economics, and sustainability, concepts like smart manufacturing and global innovation ecosystems become essential for understanding broader societal and economic effects, including global tech convergence and international collaboration.

Keywords: *Artificial Intelligence, Data Analytics, Manufacturing, Industry 4.0, Keyword Analysis, Topic Modeling*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S1877050925003205?via%3Dihub

DOI: https://doi.org/10.1016/j.procs.2025.01.312

Title of the Paper:
A Survey of AI Capabilities in Austrian Supply Chain Management

Type of Document:
Research Paper

Authors / Institution:
Christian Raab, Thomas Fischer, Patrick Brandtner

Year of Publication:
2025

Summary / Abstract:
Artificial Intelligence (AI) is increasingly important for organizations, especially in data-intensive domains like Supply Chain Management (SCM). However, simply having data and implementing AI systems doesn't ensure productive use—additional organizational resources are needed. These are captured in the recently introduced AI Capabilities model. This paper presents a survey of Austrian managers analyzing the presence of these capabilities. Based on 44 complete responses, it highlights common AI application areas in Austrian SCM and shows early adoption of AI-based systems. The results also reveal a clear difference in AI Capabilities between organizations that use AI and those that do not.

Keywords: *Artificial Intelligence, Supply Chain Management, Artificial Intelligence Capabilities, Survey*

Link to Full Document:
https://www.sciencedirect.com/science/article/pii/S1877050925001322?via%3Dihub

DOI: https://doi.org/10.1016/j.procs.2025.01.124

Conclusion

The BrAIn Library represents a significant step forward in the organization, accessibility, and utilization of academic knowledge within artificial intelligence research. By providing a centralized repository of high-quality AI literature, the library addresses a critical gap in researchers' ability to efficiently locate and integrate relevant studies into their work. Its structured approach to metadata, categorization, and cross-referencing enables users to not only retrieve papers but also understand the relationships and trends across subfields of AI, fostering a more cohesive research ecosystem.

One of the key contributions of the BrAIn Library lies in its facilitation of knowledge synthesis. Researchers can quickly identify influential works, emerging methodologies, and gaps in existing research, which accelerates the formulation of novel hypotheses and the design of experiments. Furthermore, the library's integration of machine-readable features opens possibilities for automated analysis, meta-studies, and AI-driven recommendations, enhancing both productivity and insight generation.

The development and maintenance of the BrAIn Library also highlight broader implications for scholarly communication and digital knowledge management. By providing a systematic, scalable, and accessible platform, the project demonstrates how digital libraries can bridge the divide between rapidly expanding scientific outputs and the researchers who rely on them. It emphasizes the importance of interoperability, standardization, and user-centric design in maximizing the utility of academic repositories.

In conclusion, the BrAIn Library is not only a valuable tool for individual researchers but also a model for future digital knowledge infrastructures in AI and other scientific domains. Its contribution extends beyond simple aggregation of literature: it cultivates an environment for collaborative discovery, informed decision-making, and accelerated innovation. As AI research continues to expand in scale and complexity, resources like the BrAIn Library will be indispensable for maintaining clarity, focus, and efficiency in the scientific process.