

AI in European Workplaces Insights from job advertisements

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Human-centred digital transitions: skill mismatches in
European workplaces
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CEDEFOP

The prevalence of AI titles in online job postings has grown rapidly in recent years

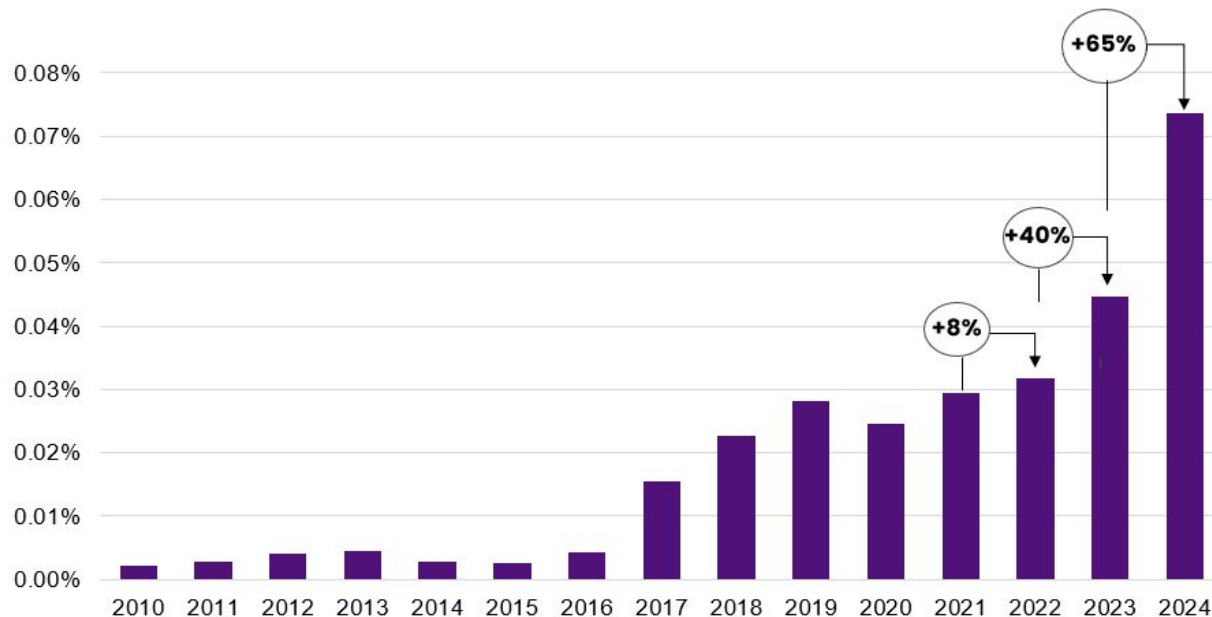
The most common AI titles include **Artificial Intelligence Engineers, Architects, and Scientists**

There is a notable growth in writing-related positions such as **AI Content and Technical Writers**

Three areas where organizations utilize AI skills:

- **Building new products**
- **Enabling new processes**
- **Improving operations**

Job postings for AI titles as a % of total job postings



Source: Job postings for AI titles as a % of total EU job postings - Lightcast Global Postings - Update 2024Q3



Job postings and social profiles help us monitor labour market changes in real time

Aggregate Data from Online Job and Networking Sites

>1 Billion

Current and historical postings

>300 Million

Career profiles

>100,000

Unique sources

Collect & Deduplicate Job Postings and Profiles



Parse & Harmonize Job Postings and Social Profiles to Generate Detailed Data

- Job Title & Occupation
- Employer & Industry
- Technical Skills
- Foundational Skills
- Certifications
- Educational Requirements
- Experience Levels
- Salaries



Defining AI

Sheikh, H., Prins, C., Schrijvers, E. (2023). Artificial Intelligence: Definition and Background. In: Mission AI. Research for Policy. Springer, Cham.
https://doi.org/10.1007/978-3-031-21448-6_2

From: Artificial Intelligence: Definition and Background



AI is ...

AI is ...

“The use of algorithms. The term ‘algorithm’ refers to a specific instruction for solving a problem or performing a calculation.”

“The imitation of all human intellectual abilities by computers.”

“The imitation of various complex human skills by machines.”

“Technology that can function appropriately and with foresight in its environment.”

“Systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.”



Defining AI

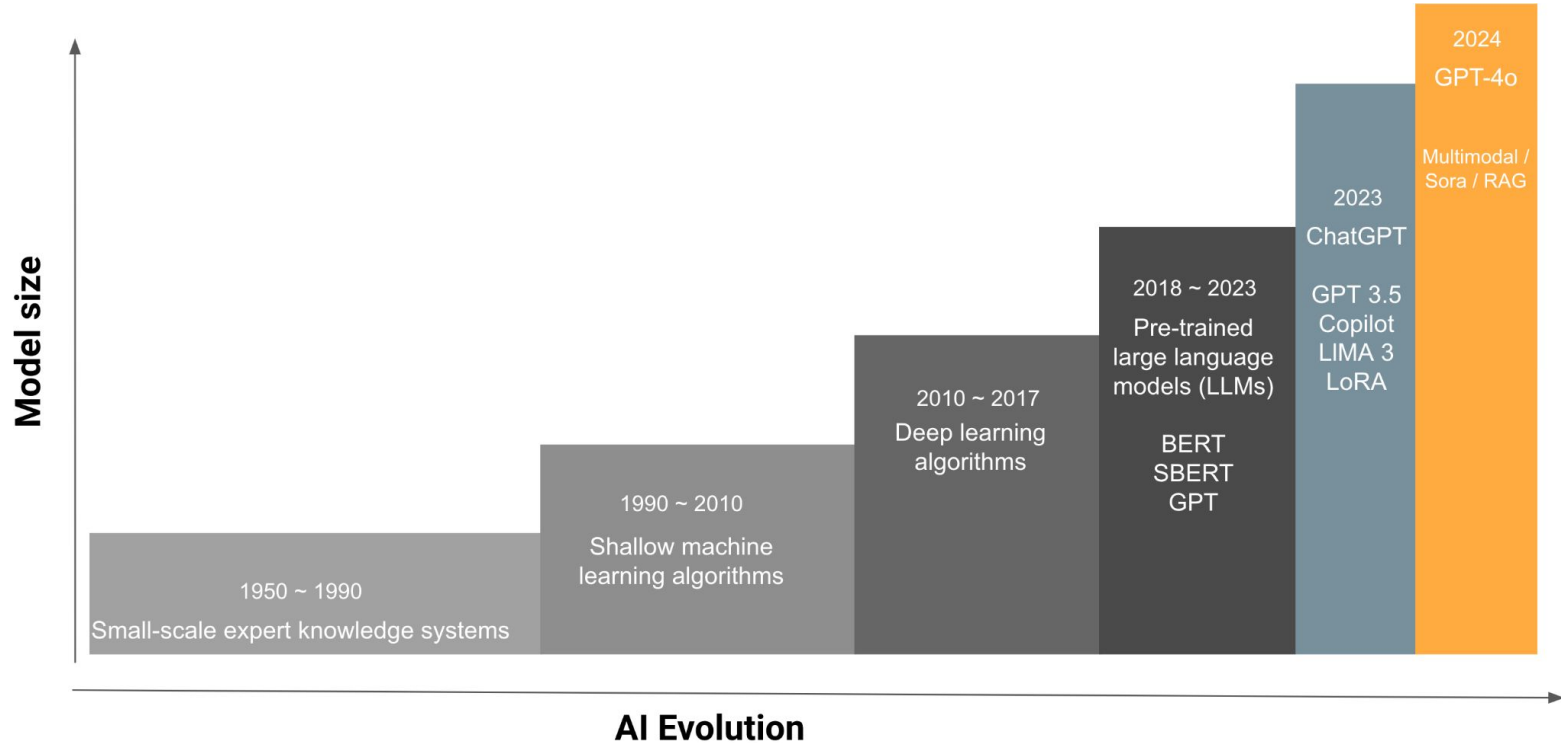
The European Union's Artificial Intelligence Act (AI Act), which entered into force on August 1, 2024, defines an AI system as:

A **machine-based system** that is designed to operate with **varying levels of autonomy** and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, **infers, from the input it receives, how to generate outputs** such as predictions, content, recommendations, or decisions **that can influence physical or virtual environments.**



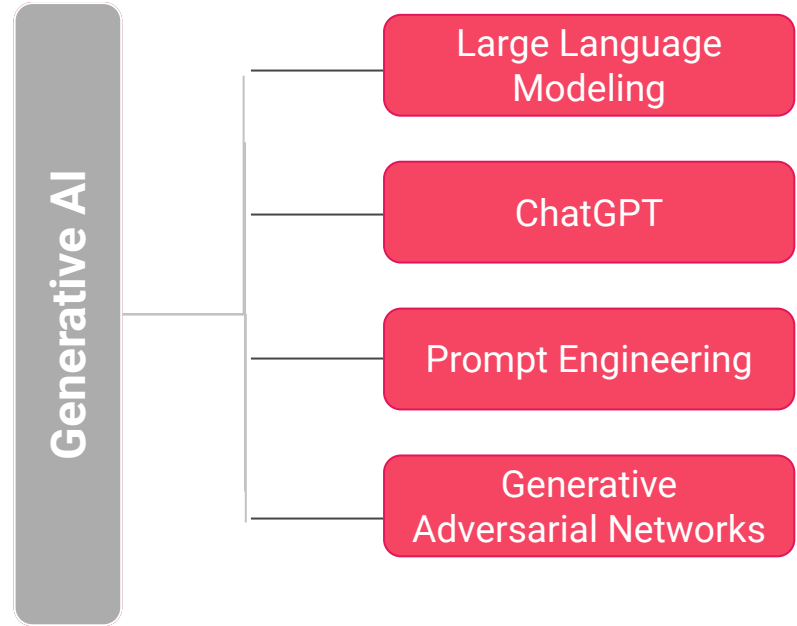
The evolution of AI

Rapid growth over the past 75 years - bigger models, faster developments



Generative AI

*“AI systems that **can create new content**, such as text, images or music, based on the data they have been trained on. These models use techniques such as neural networks and deep learning to generate outputs that mimic human-like creativity.”*



Labour market impact

Profound impact on jobs and the way we work

Job creation

- Prompt engineers
- AI engineers and technicians
- AI content writers
- ...

Task augmentation

- AI virtual assistant supporting researchers with literature review
- ChatGPT for supporting writing and translations
- ...

New career pathways

- A graphic designer into a UX designer
- An event planner into a PR agent
- A proofreader into a translator
- ...



Defining artificial intelligence skills

Artificial Intelligence	AI/ML Inference, AIOps (Artificial Intelligence For IT Operations), Applications Of Artificial Intelligence, Artificial General Intelligence, Artificial Intelligence, Artificial Intelligence Development, Artificial Intelligence Markup Language (AIML), Artificial Intelligence Systems, Azure Cognitive Services, Baidu, Cognitive Automation, Cognitive Computing, Computational Intelligence, Cortana, Ethical AI
Autonomous Driving	Advanced Driver Assistance Systems, Autonomous Cruise Control Systems, Autonomous System, Autonomous Vehicles, Guidance Navigation And Control Systems, Light Detection And Ranging (LiDAR), OpenCV
Natural Language Processing (NLP)	AI Copywriting, ANTLR, Amazon Textract, Apache OpenNLP, BERT (NLP Model), Chatbot, Computational Linguistics, Conversational AI, Dialog Systems, Fuzzy Logic, Handwriting Recognition, Hugging Face (NLP Framework)
Neural Networks	Apache MXNet, Artificial Neural Networks, Autoencoders, Caffe2, Chainer (Deep Learning Framework), Convolutional Neural Networks, Cudnn, Deep Learning, Deep Learning Methods, Deeplearning4j
Machine Learning	AWS SageMaker, AdaBoost (Adaptive Boosting), Adversarial Machine Learning, Apache MADlib, Apache Mahout, Apache SINGA, Apache Spark, Association Rule Learning, Automated Machine Learning, Autonomic Computing, Azure Machine Learning, Boosting, CHi-Squared Automatic Interaction Detection (CHAID), Classification And Regression Tree (CART), Cluster Analysis, Collaborative Filtering, Confusion Matrix, Cyber-Physical Systems, Dask (Software), Data Classification, DbSCAN, Decision Models, Decision Tree Learning
Robotics	Advanced Robotics, Bot Framework, Cognitive Robotics, Motion Planning, Nvidia Jetson, Robot Framework, Robot Operating Systems, Robotic Automation Software, Robotic Liquid Handling Systems, Robotic Programming, Robotic Systems, SLAM Algorithms (Simultaneous Localization And Mapping), Servomotor
Visual Image Recognition	3D Reconstruction, Activity Recognition, Computer Vision, Contextual Image Classification, Digital Image Processing, Eye Tracking, Face Detection, Facial Recognition, Gesture Recognition, Image Analysis, Image Matching, Image Recognition, Image Segmentation, Image Sensor
Generative Artificial Intelligence	ChatGPT, Generative Adversarial Networks, Generative Artificial Intelligence, Large Language Modeling, Prompt Engineering



Methodology (1)

JOB POSTINGS DATA

DATA SOURCES

- Lightcast proprietary data
- Billions of job postings scraped daily from thousands of online job boards, newspapers and employers sites
- Cleaned, deduplicated and categorised.

TIME FRAME

- Job postings data allows to capture almost-real time insights from the labor market
- The analysis presented in this paper is based on 2019-2024 data
- 2019 is the year selected to look at change over time.

SAMPLE QUALITY

- Only captures job postings that have been published online.
- This works best for professional services jobs - less so for others, such as agriculture.
- Quality of the data is based on what employers mentioned in the postings. Some things may be taken for granted.



Methodology (2)

JOB POSTINGS DATA

DEFINING AI

Based on Lightcast's taxonomy of 30,000+ skills. AI skills categorized into clusters

AI Job Definition: Mention of any AI skill in job text.

CLUSTERING OCCUPATIONS

Occupations categorized into three clusters:

- **Build:** High AI integration for creating new products.
- **Enable:** AI used to streamline new processes.
- **Improve:** AI enhances existing operations.

Quartiles used to assign clusters based on AI integration levels.

ANALYTICAL FRAMEWORK

Revealed Comparative Advantage (RCA): Measures AI skill significance for specific occupations.

$$RCA_{ij} = \frac{(S_{ij}/T_i)}{(S_j/T)}$$



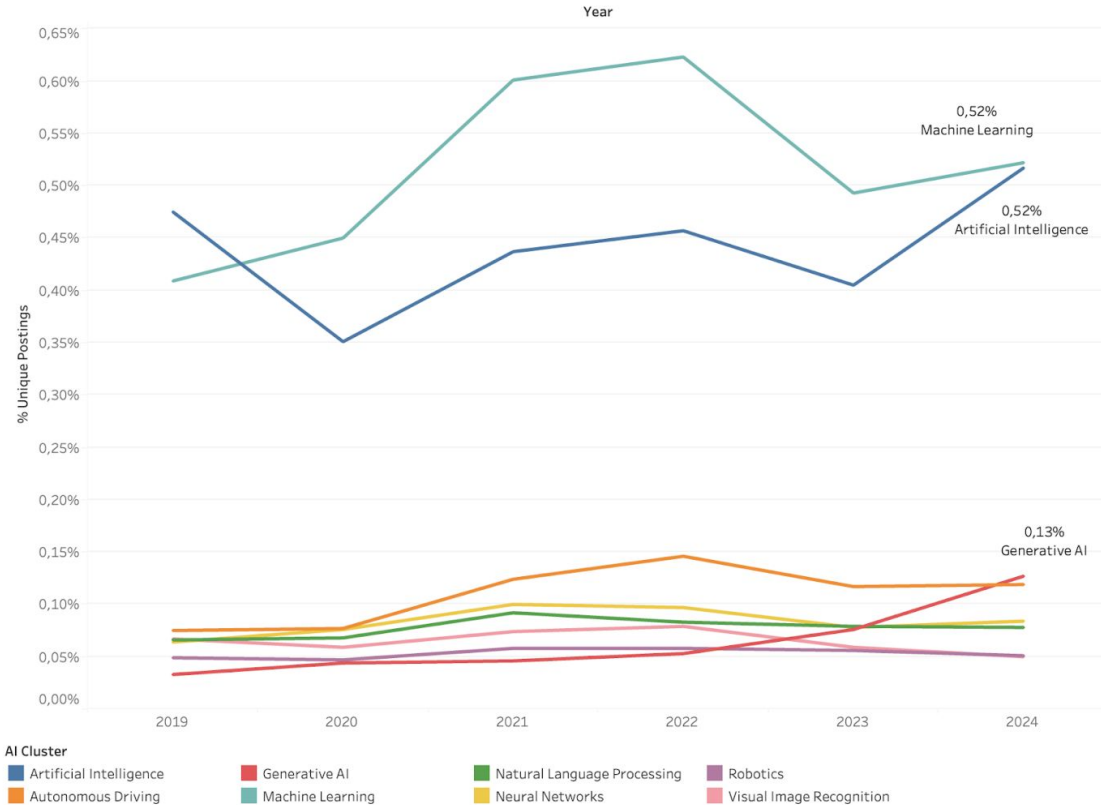
The AI skills most mentioned in the EU labour market

From 2019 to 2024, demand for AI skills in Europe has grown significantly.

Generative AI experienced **330% growth**, driven by applications in the creative industries, healthcare, finance, manufacturing and education.

Natural Language Processing and Neural Networks have shown consistent growth, reflecting their importance in language-centric and predictive applications. **Robotics and Visual Image Recognition** have maintained steady demand, indicating their mature adoption across industries.

The rise of Generative AI highlights its transformative potential, comparable to breakthroughs like electricity and computing. However, achieving the **full potential of AI requires meeting three critical needs: access to diverse, high-quality data, advancements in computational power, and robust feedback mechanisms for iterative model improvement.**



Job postings requesting AI skills as a % of total job postings, by skill clusters in EU countries - Lightcast Global Postings



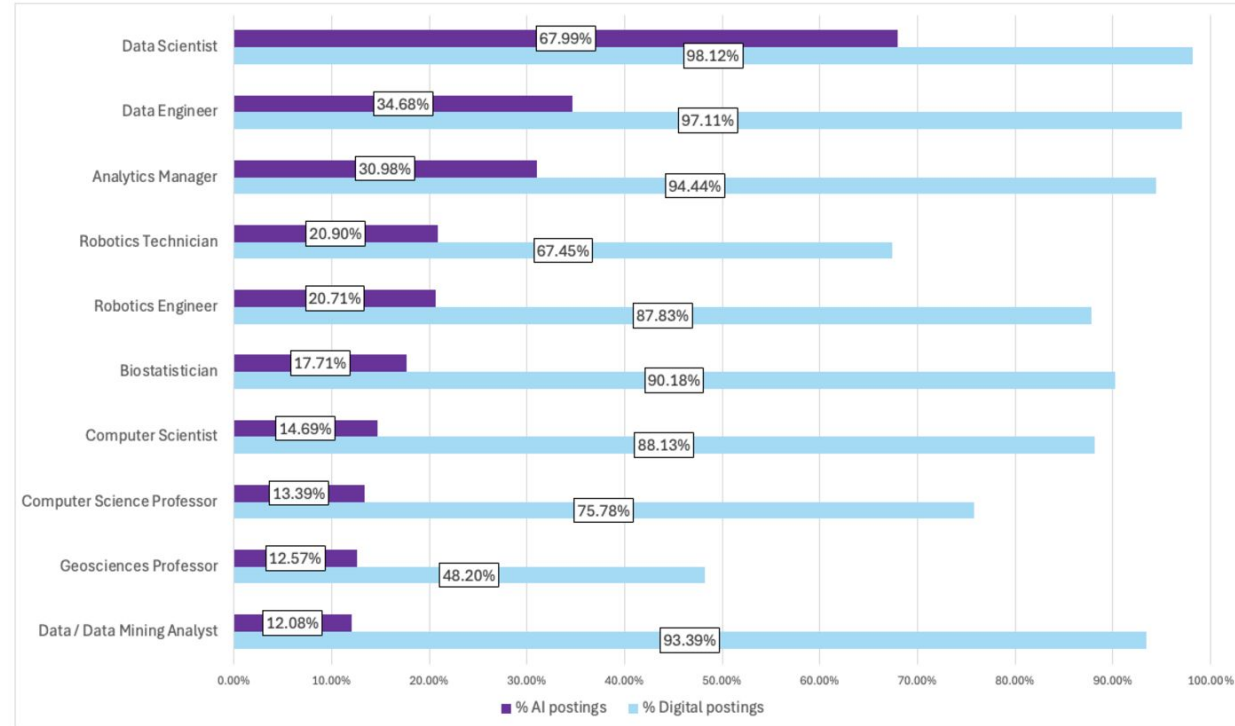
AI demand *is* highest in IT jobs

AI is transforming the labour market, with Data Scientists leading demand at 67.99% of AI-related job postings.

Data Engineers, Analytics Managers and Robotics Engineers also highlight AI's impact on innovation and operational efficiency.

Specialized roles, such as Biostatisticians, show AI's relevance in healthcare, including predictive modeling and drug discovery.

In Europe, **practical applications include AI optimizing supply chains, autonomous robots improving agricultural productivity, and advanced AI systems enhancing fraud detection in finance**

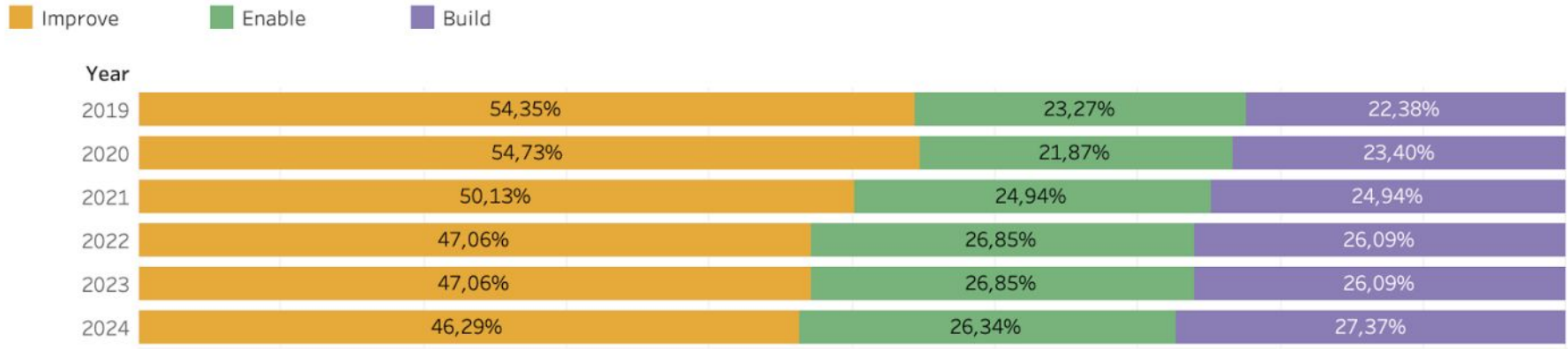


Top 10 occupation requesting AI skills as a % of total job postings and the % of digital postings (postings with at least one digital skill) in EU countries (2023) - Lightcast Global Postings

The evolution of AI-related roles highlights a shift from optimizing existing systems ("Improve") to developing innovative AI-driven products and services ("Build").

This trend reflects growing applications like AI-powered diagnostic tools in healthcare, algorithmic trading in finance, personalized education platforms, and smart city infrastructure.

The expansion of "Enable" roles further emphasizes the integration of AI to streamline processes across industries. However, this rapid growth brings challenges tied to the **alignment problem, which focuses on ensuring AI systems are trustworthy, aligned with human goals, and free from harmful biases**. As AI takes on a larger role in operational and decision-making processes, developing robust methodologies to enhance trust and reduce bias becomes critical. Success will depend on interdisciplinary collaboration and a workforce skilled in both AI technologies and domain-specific knowledge, ensuring ethical and effective AI deployment in diverse sectors.



Building new products: the emphasis is on job titles associated with computer programming, data science and robotics.

Machine learning and model training are the most in-demand skills.

Top occupations that are using AI to build new products - EU countries (2023) - Lightcast Global Postings

Occupation	Cluster	AI Share	Artificial Intelligence	Autonomous Driving	Generative AI	Machine Learning	Natural Language Processing	Neural Networks	Robotics	Visual Image Recognition
Data Scientist	Build	67.99%	18.33%	1.84%	3.41%	48.85%	3.68%	20.03%	0.31%	3.56%
Data Engineer	Build	34.68%	18.08%	0.92%	0.95%	73.91%	1.14%	3.92%	0.16%	0.93%
Analytics Manager	Build	30.98%	32.30%	0.48%	3.81%	50.40%	1.98%	9.02%	0.00%	2.01%
Robotics Technician	Build	20.90%	14.39%	7.27%	0.98%	15.76%	0.00%	6.89%	44.39%	10.30%
Robotics Engineer	Build	20.71%	12.30%	13.31%	0.38%	10.94%	0.46%	5.50%	47.67%	9.44%
Biostatistician	Build	17.71%	18.81%	0.52%	1.14%	61.28%	0.88%	12.89%	0.21%	4.26%
Computer Scientist	Build	14.69%	27.12%	3.15%	8.46%	31.69%	10.55%	14.45%	1.19%	3.39%
Computer Science Professor	Build	13.39%	46.63%	4.21%	1.97%	30.13%	2.46%	7.37%	2.46%	4.78%
Geosciences Professor	Build	12.57%	18.87%	49.06%	0.00%	24.53%	0.00%	7.55%	0.00%	0.00%
Data / Data Mining Analyst	Build	12.08%	25.54%	1.73%	2.19%	56.82%	6.02%	6.45%	0.26%	0.99%
Database Architect	Build	11.66%	30.83%	1.72%	1.82%	57.45%	2.58%	3.97%	0.34%	1.30%
Physical Scientist	Build	11.65%	20.45%	11.36%	8.52%	43.75%	0.57%	10.80%	0.57%	3.98%
Hydrologist	Build	11.32%	29.28%	44.14%	0.00%	20.27%	0.00%	6.31%	0.00%	0.00%
Researcher / Research Associate	Build	11.27%	26.37%	7.30%	2.94%	36.79%	3.50%	11.81%	2.63%	8.66%
Financial Quantitative Analyst	Build	10.37%	20.08%	1.38%	1.97%	63.78%	2.36%	9.25%	0.20%	0.98%
Statistician	Build	9.90%	23.99%	2.65%	1.77%	56.44%	4.33%	8.06%	0.29%	2.46%
Geographer / GIS Specialist	Build	8.06%	11.59%	57.00%	0.17%	20.77%	0.52%	4.03%	0.34%	5.58%
Biomedical Engineer	Build	7.71%	26.47%	1.42%	1.42%	41.21%	3.37%	15.28%	0.53%	10.30%
Chief Information Officer	Build	7.14%	42.60%	3.41%	5.21%	37.67%	4.66%	3.34%	0.49%	2.64%
Soil / Plant Scientist	Build	7.04%	17.19%	37.50%	0.00%	18.75%	6.25%	12.50%	0.00%	7.81%
Optical / Laser Engineer	Build	7.03%	14.90%	28.61%	0.96%	15.87%	3.61%	7.45%	2.16%	26.44%



The Build cluster focuses on developing innovative AI-driven products and solutions, leveraging advanced technologies like **machine learning, generative AI, and robotics**. These roles drive progress in fields such as healthcare, finance, and design, pushing the boundaries of AI applications.

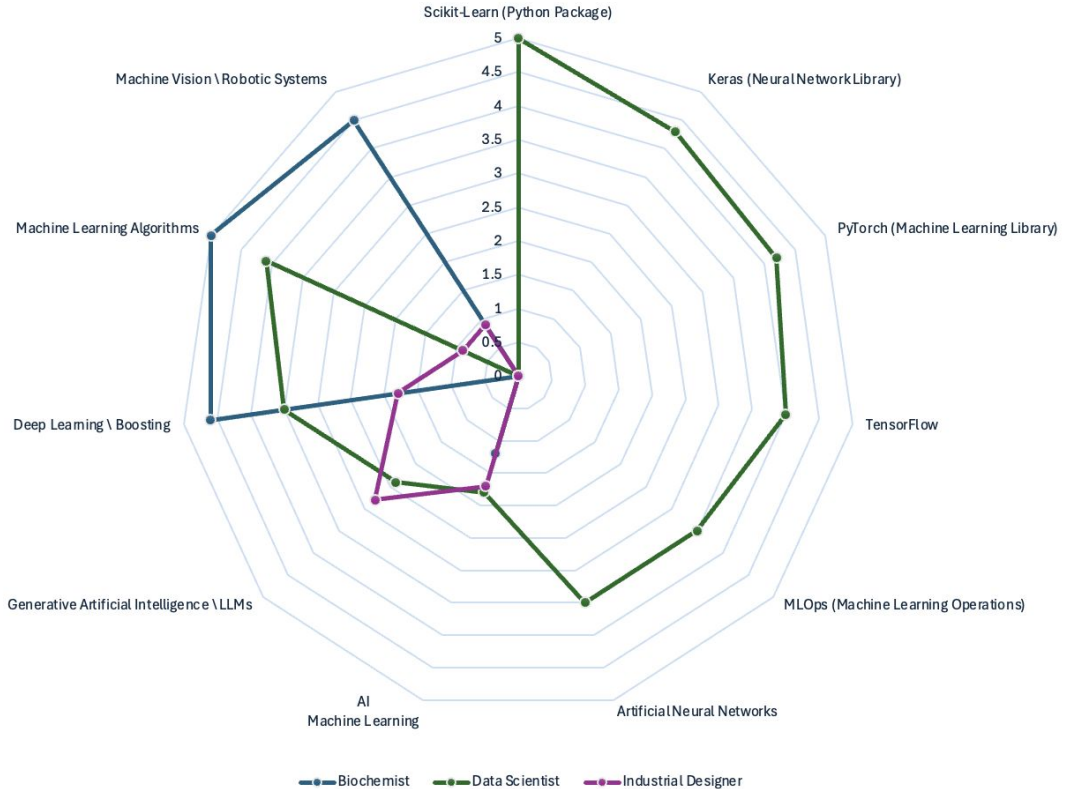
AI use-cases in job postings	
Biochemist	Drug discovery optimization: "Seeking a Biochemist to develop machine learning algorithms for optimising drug discovery processes. The ideal candidate will use boosting techniques to enhance predictive models and integrate robotic systems for high-throughput screening."
Data Scientist	Advanced language model development: "Looking for a Data Scientist to build and refine large language models using cutting-edge libraries like PyTorch and TensorFlow. The role involves developing MLOps pipelines for efficient model deployment and leveraging Scikit-Learn for preliminary data analysis. Expertise in Keras for building artificial neural networks is crucial."
Industrial Designer	AI in product development: "Hiring an Industrial Designer to incorporate AI into the product development lifecycle. The role involves leveraging generative AI for concept generation, using ChatGPT for ideation support, and integrating autonomous systems thinking into product design. Experience with AI-driven design optimization is a plus."

Source: Lightcast job postings



Job-Specific AI Skills

Example from the build cluster



Source: Lightcast job postings



Enabling new processes: among roles that are requesting AI, job postings imply that Project managers and Operations Managers are leveraging GenAI the most

Top occupations that are using AI to enable new processes - EU countries (2023) - Lightcast Global Postings

Occupation	Cluster	AI Share	Artificial Intelligence	Autonomous Driving	Generative AI	Machine Learning	Natural Language Processing	Neural Networks	Robotics	Visual Image Recognition
Operations and Maintenance Specialist	Enable	1.33%	41.14%	7.30%	2.32%	30.36%	7.30%	3.94%	5.91%	1.74%
Project Manager	Enable	1.33%	40.09%	16.19%	4.64%	23.78%	7.07%	2.40%	1.91%	3.92%
Surveying / Mapping Technician	Enable	1.33%	13.04%	51.30%	1.16%	21.45%	1.74%	3.19%	4.64%	3.48%
Youth Counselor / Worker	Enable	1.33%	7.30%	4.65%	0.77%	83.30%	0.33%	0.11%	3.10%	0.44%
Broadcast Technician	Enable	1.32%	49.33%	6.67%	0.00%	18.67%	1.33%	1.33%	20.00%	2.67%
Chief Financial Officer	Enable	1.31%	62.68%	1.41%	2.35%	27.23%	4.46%	0.94%	0.23%	0.70%
Producer	Enable	1.29%	58.96%	0.75%	8.21%	20.15%	6.72%	0.75%	4.48%	0.00%
Media / Talent Director	Enable	1.28%	40.52%	1.04%	4.42%	37.40%	2.60%	5.71%	1.56%	6.75%
Mechanical / Electrical Drafter	Enable	1.27%	9.57%	72.17%	12.17%	1.74%	2.61%	0.00%	0.87%	0.87%
Regulatory Affairs Specialist	Enable	1.27%	56.92%	5.14%	0.79%	31.62%	2.77%	0.79%	0.40%	1.58%
Sustainability Specialist	Enable	1.26%	43.16%	19.39%	1.90%	27.38%	2.66%	3.04%	1.14%	1.33%
Director of Instruction / Curriculum	Enable	1.25%	48.28%	9.66%	6.90%	18.62%	4.83%	6.21%	0.69%	4.83%
Communications / Public Relations	Enable	1.20%	41.28%	10.10%	7.60%	25.47%	9.59%	2.16%	2.59%	1.21%
Technical Sales Representative	Enable	1.16%	34.60%	5.65%	5.39%	34.18%	6.74%	2.53%	2.32%	8.60%
Investment Fund Manager	Enable	1.15%	37.33%	4.00%	2.67%	46.67%	0.67%	2.67%	1.33%	4.67%
Marketing Assistant / Associate	Enable	1.15%	46.77%	3.12%	8.42%	23.46%	9.37%	1.74%	4.07%	3.05%
Business Development / Sales Manager	Enable	1.12%	44.55%	8.13%	6.29%	27.67%	4.99%	1.37%	1.38%	5.63%
Economist	Enable	1.12%	33.82%	7.78%	2.53%	38.70%	10.13%	3.25%	2.89%	0.90%
Corporate Development Analyst / Manager	Enable	1.08%	40.15%	8.80%	4.83%	25.65%	11.65%	3.10%	3.47%	2.35%
Career Counselor	Enable	1.08%	28.70%	7.13%	2.46%	50.15%	5.29%	2.40%	2.15%	1.72%
Human Resources / Labor Relations	Enable	1.08%	27.19%	9.40%	5.13%	42.01%	8.49%	2.80%	2.02%	2.95%



The Enable cluster focuses on integrating AI into new processes, leveraging technologies like generative AI, computer vision, and chatbots to revolutionize operations. These roles drive advancements in **autonomous systems**, **AI-enhanced design**, **ethical AI governance**, and **strategic communication**, enabling smarter, more efficient workflows across sectors.

AI use-cases in job postings	
Business Development / Sales Manager	AI Solution sales: "We're seeking a Business Development Manager to drive sales of our AI-powered solutions. The ideal candidate will have a strong understanding of generative AI and computer vision applications across industries. Experience in demonstrating chatbot and ChatGPT-like technologies to potential clients is crucial. Knowledge of remote sensing applications will be advantageous for targeting specific market segments."
Compliance Officer / Analyst	AI Ethics: "We're looking for a Compliance Officer specialising in AI governance. The role involves developing policies for the ethical use of generative AI and machine learning in business operations. Experience in creating compliance frameworks for autonomous systems and understanding the implications of AI algorithms in decision-making processes is crucial."
Operations and Maintenance Specialist	Facility Management: "We're hiring an Operations and Maintenance Specialist to oversee AI-integrated facility management systems. The role involves working with robot operating systems, managing AI-powered chatbots for facility requests, and utilising large language models for documentation and reporting. Experience with advanced driver assistance systems for facility vehicles and remote sensing for infrastructure monitoring is highly valued."



Improving operations: employers ask individual contributors to use AI to augment tasks, and managers to determine how to use AI to augment processes

Top occupations that are using AI to improve operations - EU countries (2023) - Lightcast Global Postings

Occupation	Cluster	AI Share	Artificial Intelligence	Autonomous Driving	Generative AI	Machine Learning	Natural Language Processing	Neural Networks	Robotics	Visual Image Recognition
Sound Engineering Technician	Improve	0.59%	45.71%	17.14%	8.57%	14.29%	5.71%	8.57%	0.00%	0.00%
Construction / Building Inspector	Improve	0.59%	18.06%	3.96%	55.07%	14.10%	0.00%	3.08%	3.96%	1.76%
Automotive Service Technician / Mechanic	Improve	0.59%	10.00%	49.72%	11.39%	14.56%	5.21%	0.97%	5.27%	2.88%
Laboratory Technologist	Improve	0.59%	8.20%	3.28%	1.64%	45.90%	4.92%	6.56%	1.64%	27.87%
Tax Manager	Improve	0.58%	49.79%	2.47%	2.88%	35.80%	6.17%	0.00%	2.06%	0.82%
Medical Coder	Improve	0.58%	11.76%	0.00%	0.00%	52.94%	0.00%	29.41%	0.00%	5.88%
Archivist	Improve	0.58%	60.00%	8.57%	2.86%	20.00%	8.57%	0.00%	0.00%	0.00%
Printing Press Operator	Improve	0.58%	17.05%	51.14%	5.68%	21.59%	3.41%	0.00%	1.14%	0.00%
Food / Agricultural Technician	Improve	0.57%	29.17%	10.12%	4.76%	38.69%	0.60%	3.57%	7.14%	5.95%
Math Teacher	Improve	0.57%	20.73%	25.09%	2.18%	33.45%	1.45%	9.45%	4.73%	2.91%
Urban / Transportation Planner	Improve	0.56%	23.45%	30.91%	8.18%	28.91%	1.64%	1.09%	5.09%	0.73%
Preschool / Childcare Teacher	Improve	0.55%	16.88%	2.95%	0.98%	68.35%	4.70%	3.00%	2.28%	0.85%
Logistics Engineer	Improve	0.55%	43.48%	30.43%	0.00%	19.57%	6.52%	0.00%	0.00%	0.00%
Office Manager	Improve	0.53%	43.15%	7.44%	5.21%	23.59%	10.84%	1.70%	4.36%	3.72%
Merchandiser	Improve	0.52%	26.82%	10.65%	11.44%	39.84%	3.75%	0.79%	3.94%	2.76%
Administrative Manager	Improve	0.52%	34.35%	8.71%	13.88%	26.12%	12.94%	1.65%	1.18%	1.18%
Counter / Rental Clerk	Improve	0.50%	10.81%	5.74%	5.74%	67.57%	2.70%	1.35%	5.74%	0.34%
Accounting Supervisor	Improve	0.50%	55.32%	10.64%	2.13%	14.89%	12.77%	2.13%	2.13%	0.00%
Event Planner	Improve	0.50%	36.90%	9.58%	3.10%	38.03%	4.51%	2.82%	3.10%	1.97%
Title Examiner / Clerk	Improve	0.49%	38.03%	14.08%	4.23%	21.13%	2.82%	12.68%	5.63%	1.41%
Product Demonstrator / Promoter	Improve	0.49%	27.75%	13.44%	4.91%	26.30%	11.71%	4.19%	4.34%	7.37%



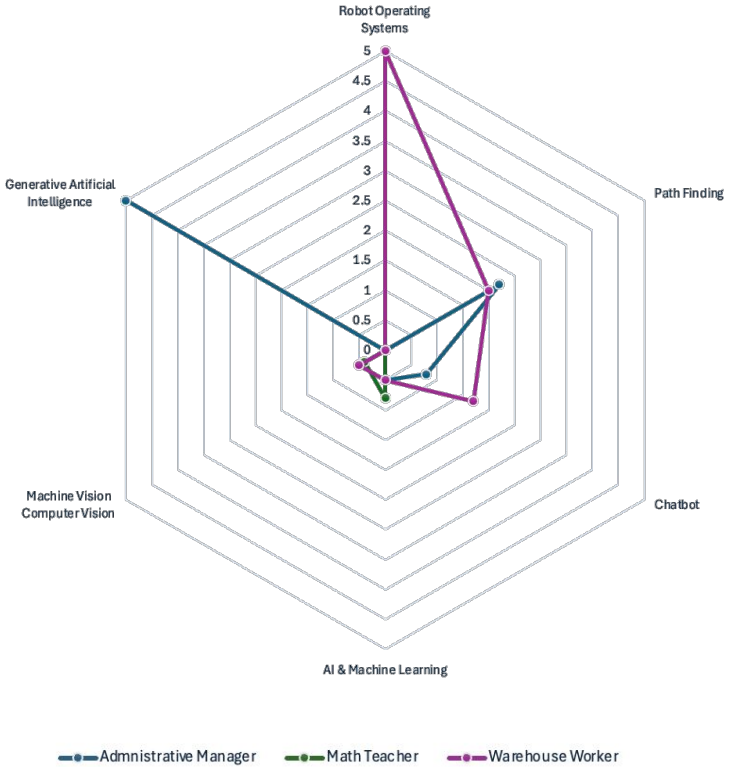
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AI use-cases in job postings	
Administrative Manager	Workflow optimization: "Seeking an Administrative Manager to implement generative AI solutions for streamlining office operations. The ideal candidate will leverage AI for intelligent task scheduling, document generation, and process optimization. Experience with AI-driven chatbots for internal communication and service requests is a plus. Knowledge of MLOps principles for maintaining AI systems is desirable."
Warehouse Worker	Enhanced logistics operations: "We're hiring Warehouse Workers familiar with AI-driven robotic systems. The role involves working alongside autonomous robots using Robot Operating Systems. Experience with AI-powered path-finding algorithms for efficient warehouse navigation is highly valued. Familiarity with chatbots for inventory queries and machine vision systems for quality control will be advantageous."
Math Teacher	Enhanced instruction and custom curriculum: "We're hiring a Math Teacher to incorporate AI tools into mathematics curriculum. The ideal candidate will have experience using machine learning algorithms to personalise student learning paths and generate practice problems. Familiarity with AI-powered visual tools for explaining complex mathematical concepts is desirable. The role involves collaborating with the IT department to implement and maintain these AI systems in the classroom."

Source: Lightcast job postings

Job-Specific AI Skills

Example from the improve cluster



Example from the enable cluster



Source: Lightcast job postings





Thanks !

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