

# Big Data for Labour Market Intelligence

Capacity development programme 2024

## Workshop 2: AI and the impact on Labour Market and Education

### Session 1

AI's Impact on the Labour Market: Trends and Challenges from Global Job  
Postings

# Technology Is Transforming Work at an Unprecedented Pace

## Top Occupations

These occupations had next to no job postings five years ago—since then, they've exploded. We've divided these emerging occupations into two groups: non-degree occupations (occupations that don't require a bachelor's degree), and degree occupations (occupations that do).

### NON-DEGREE OCCUPATIONS

1	<b>Influencer</b> 124%
2	<b>Fintech Sales Rep</b> 89%
3	<b>Landfill Gas Technician</b> 55%
4	<b>Additive Manufacturing Technician</b> 46%
5	<b>Solar Installer</b> 35%
6	<b>Order Processor/Order Entry Clerk</b> 30%
7	<b>Solar Sales Rep</b> 29%
8	<b>Cargo Coordinator/Freight Forwarder</b> 28%
9	<b>Automation Technician</b> 20%
10	<b>Robotics Tech</b> 13%

### DEGREE OCCUPATIONS

1	<b>AI Consultant</b> 89%
2	<b>Blockchain/Web3 Developer</b> 56%
3	<b>People Analytics Professional</b> 52%
4	<b>Augmented Reality Engineer</b> 37%
5	<b>ML Ops</b> 36%
6	<b>Alternative Energy Manager</b> 35%
7	<b>Diversity Chief Officer</b> 34%
8	<b>E-Commerce Specialist</b> 32%
9	<b>Content Marketing Specialist</b> 29%
10	<b>Distributed Energy Engineer</b> 27%

Source: Lightcast, Global Job Postings

# Demand for Skills Is Changing Across the Economy

## Top Skills

These are the skills with the highest rate of growth since 2016. Human skills apply across multiple industries, indicating the *general personas* that companies are looking for. Technical skills are unique to specific jobs, indicating the *particular abilities* that companies are looking for.

### HUMAN SKILLS

1	<b>Companionship</b>	33%
2	<b>Critical Thinking</b>	18%
3	<b>Goal Setting</b>	15%
4	<b>Self-Starter</b>	15%
5	<b>Self-Motivation</b>	15%
6	<b>Organizational Skills</b>	14%
7	<b>Independent Thinking</b>	13%
8	<b>Oral Communication</b>	13%
9	<b>Strategic Thinking</b>	13%
10	<b>Creativity</b>	13%

### TECHNICAL SKILLS

1	<b>DevSecOps</b>	221%
2	<b>Vue.js</b>	166%
3	<b>Kubernetes</b>	109%
4	<b>Looker Data Platform</b>	102%
5	<b>TensorFlow</b>	99%
6	<b>Hiring Practices</b>	89%
7	<b>Microsoft Power BI</b>	78%
8	<b>DataDog</b>	77%
9	<b>Blockchain</b>	76%
10	<b>Data Lakes / Reservoirs</b>	73%

Source: Lightcast, Global Job Postings

# Survey Data Has Significant Lags and missing detail information


Harvard Business Review | Ascend

Diversity | Latest | Magazine | Ascend | Topics | Podcasts | Video | Store | The Big Idea

Career Planning

## Why Robots Won't Steal Your Job

by Nahia Orduña  
March 19, 2021



### The Jobs of Tomorrow

New technologies, products, and services are driving greater demand for new jobs in the industries listed below. The roles are organized below their corresponding industries and are ordered by the scale of each opportunity.

Data and AI		Product Development	
1	Artificial intelligence specialist	1	Product owner
2	Data scientist	2	Quality assurance tester
3	Data engineer	3	Agile coach
4	Big data developer	4	Software quality assurance engineer
5	Data analyst	5	Product analyst

European Commission

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## Occupations

Search occupations

Artificial intelligence

Find

Hierarchy view

### Search result

- 2511.11 - ICT intelligent systems designer
- 2529.9 - knowledge engineer
- 2511.2 - computer vision engineer
- 2422.8 - intelligence officer
- 0310.4 - intelligence communications interceptor

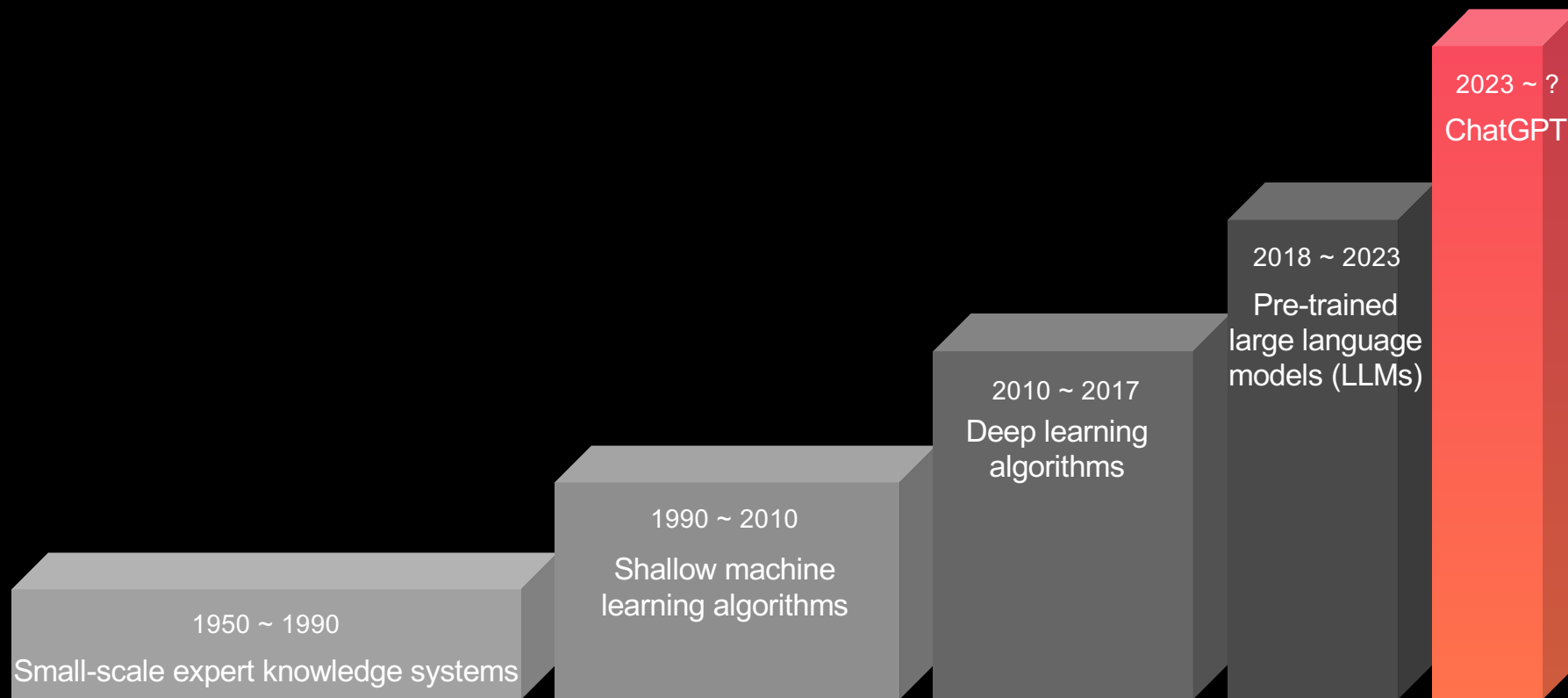
### Systems analysts

Professionals >  
Information and communications technology professionals >  
Software and applications developers and analysts > Systems analysts >

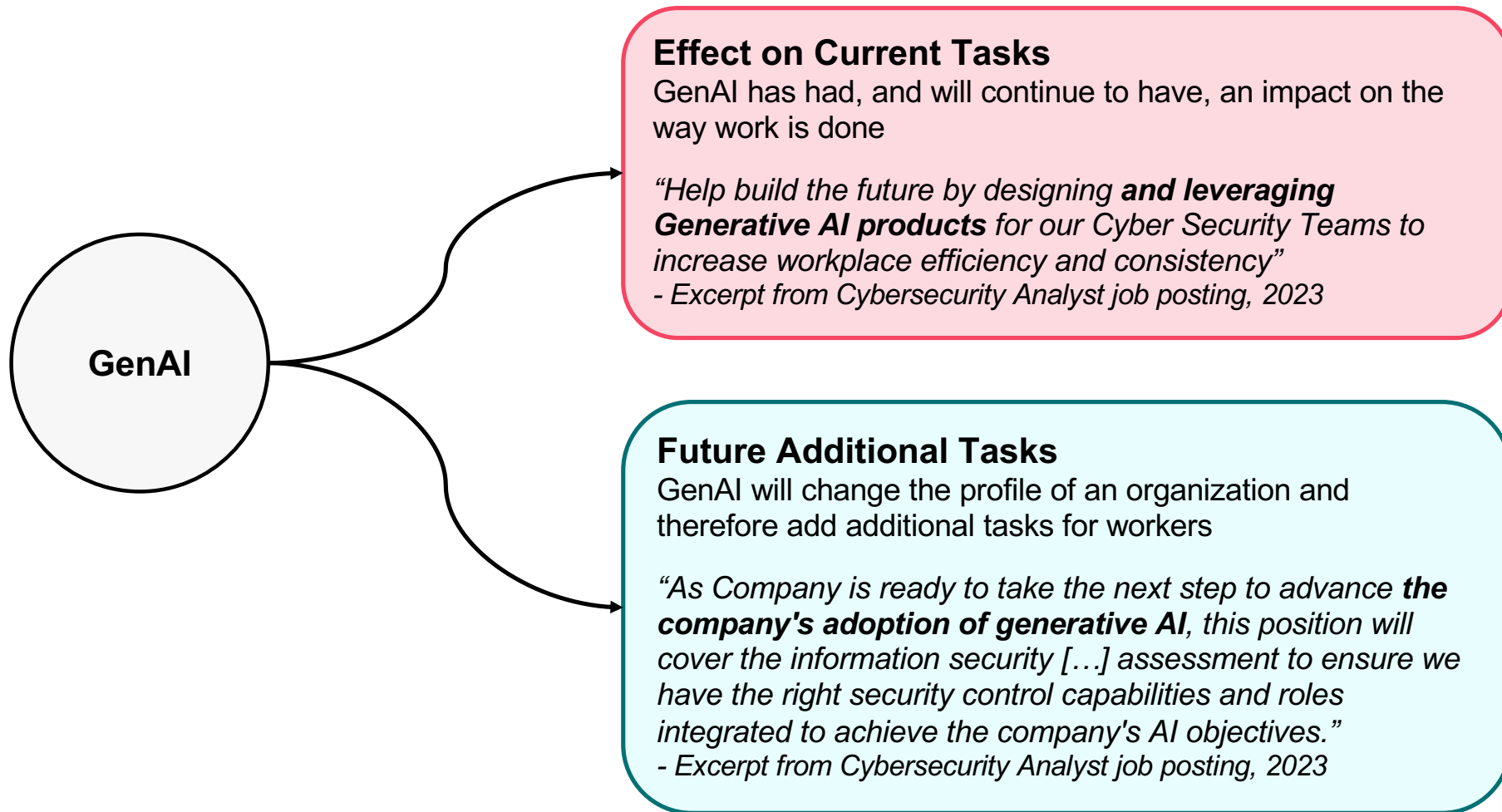
### Description

### Code

# Advancements in NLP

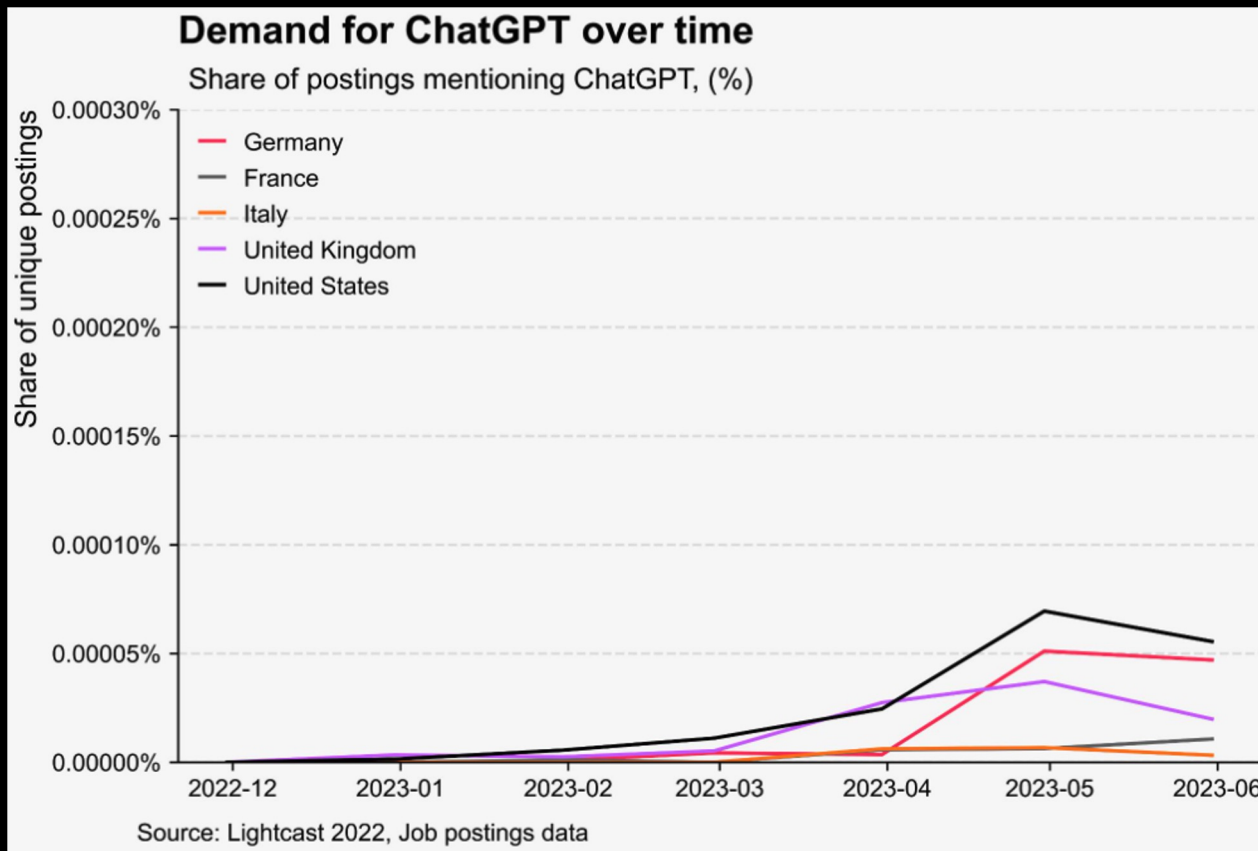


# Impact of GenAI on Occupations



# New skills are emerging every day

## ChatGPT growing fast but still small for now, what's next?



# But what is their role?

## Manage:

Admin databases etc..

## Run:

spreadsheets, digital communication tools etc..

## Build:

Networking and telecommunications (antenna, fibre etc)..

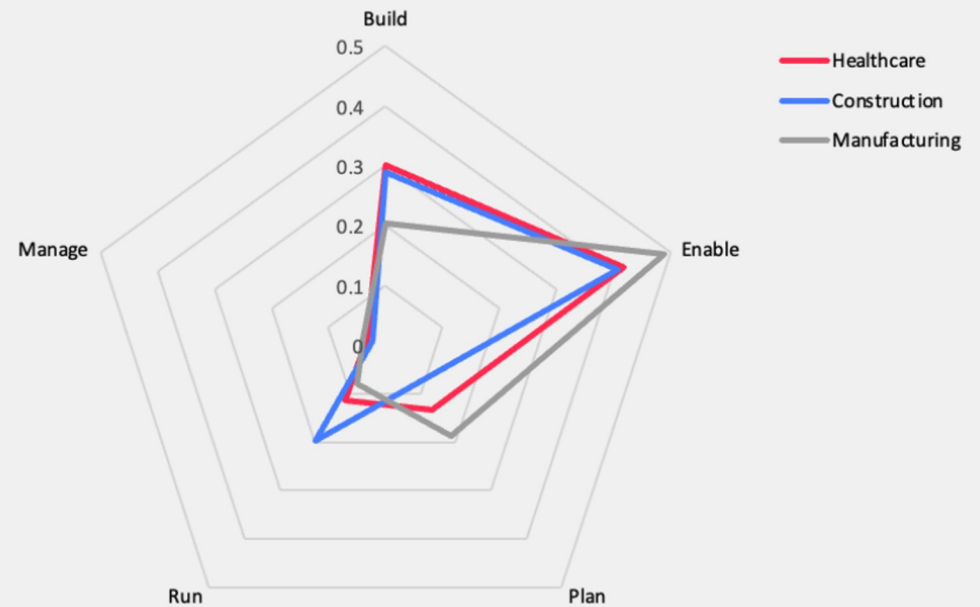
## Enable:

Geospatial engineering, automation etc...

## Plan:

Computer graphics, CAD etc..

Type of digital skills according to the EU e-competence framework



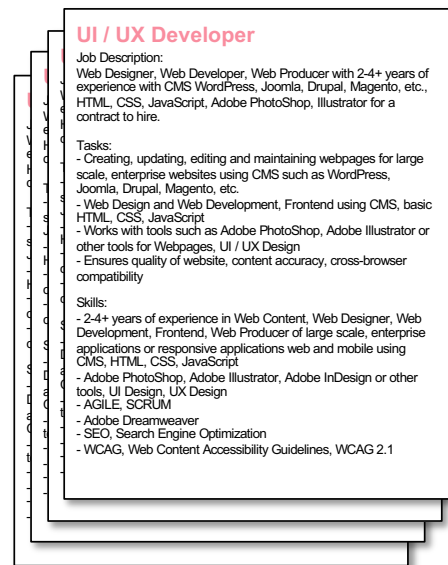


# Recap: methodology

## Aggregate Data from Online Job and Networking Sites



## Collect & Deduplicate Job Postings and Profiles



## Parse Job Postings and Standardize Social Profiles to Generate Detailed Data

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

# Data

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Data analysis from online job vacancy data from Lightcast

	English-speaking	European
Countries	Australia, Canada, New Zealand, United States, United Kingdom	Austria, Belgium, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland
Taxonomies	<ul style="list-style-type: none"><li>• Lightcast Occupation Taxonomy</li><li>• Lightcast Skills Taxonomy (32,000+ skills)</li></ul>	<ul style="list-style-type: none"><li>• ESCO Occupation Taxonomy</li><li>• ESCO skills (~14,000 skills)</li></ul>

# Bag-of-Words Approach

List of AI Skill clusters

**Artificial Intelligence:** Expert System, IBM Watson, [IPSoft](#) Amelia, [Ithink](#), Virtual Agents, Autonomous Systems, Lidar, OpenCV, Path Planning, Remote Sensing

**Natural Language Processing (NLP):** ANTLR, Automatic Speech Recognition (ASR), Chatbot, Computational Linguistics, [Distinguo](#), Latent Dirichlet Allocation, Latent Semantic Analysis, [Lexalytics](#), Lexical Acquisition, Lexical Semantics, Machine Translation (MT), Modular Audio Recognition Framework (MARF), [MoSes](#), Natural Language Processing, Natural Language Toolkit (NLTK), Nearest Neighbour Algorithm, [OpenNLP](#), Sentiment Analysis/Opinion Mining, Speech Recognition, Text Mining, Text to Speech (TTS), Tokenization, Word2Vec

**Neural Networks:** Caffe Deep Learning Framework, Convolutional Neural Network (CNN), Deep Learning, Deeplearning4j, [Keras](#), Long Short-Term Memory (LSTM), [MXNet](#), Neural Networks, [Pybrain](#), Recurrent Neural Network (RNN), TensorFlow

**Machine Learning:** AdaBoost algorithm, Boosting (Machine Learning), Chi Square Automatic Interaction Detection (CHAID), Classification Algorithms, Clustering Algorithms, Decision Trees, Dimensionality Reduction, Google Cloud Machine Learning Platform, Gradient boosting, H2O (software), [Libsvm](#), Machine Learning, [Madlib](#), Mahout, Microsoft Cognitive Toolkit, MLPACK (C++ library), [Mlpy](#), Random Forests, Recommender Systems, Scikit-learn, Semi-Supervised Learning, Supervised Learning (Machine Learning), Support Vector Machines (SVM), Semantic Driven Subtractive Clustering Method (SDSCM), Torch (Machine Learning), Unsupervised Learning, [Vowpal](#), [Xgboost](#)

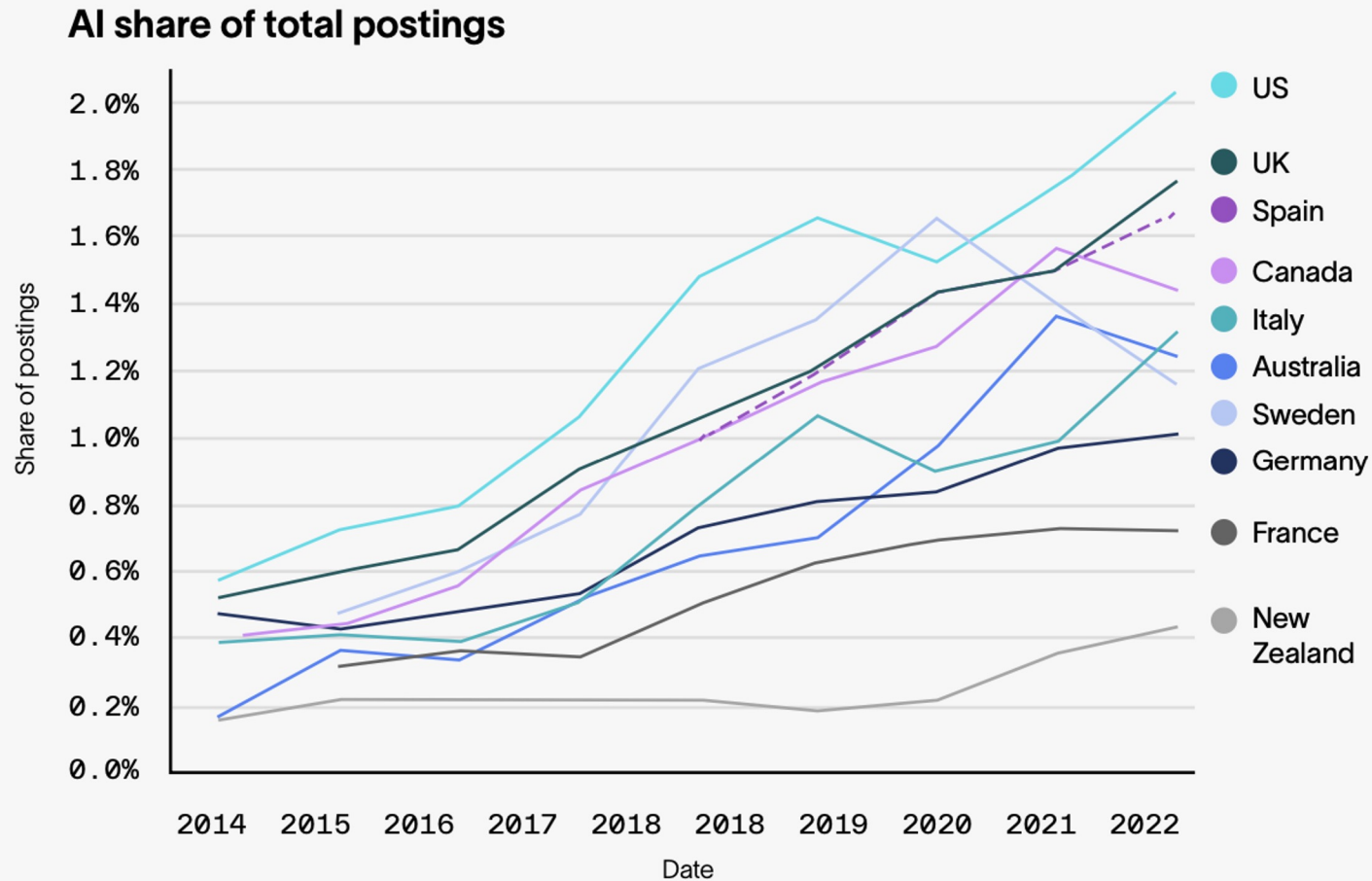
**Robotics:** Blue Prism, Electromechanical Systems, Motion Planning, [Motoman](#) Robot Programming, Robot Framework, Robotic Systems, Robot Operating System (ROS), Robot Programming, Servo Drives / Motors, Simultaneous Localization and Mapping (SLAM)

**Visual Image Recognition:** Computer Vision, Image Processing, Image Recognition, Machine Vision, Object Recognition



# Characterizing positions that require AI skills across countries

# AI disrupting the way we work?

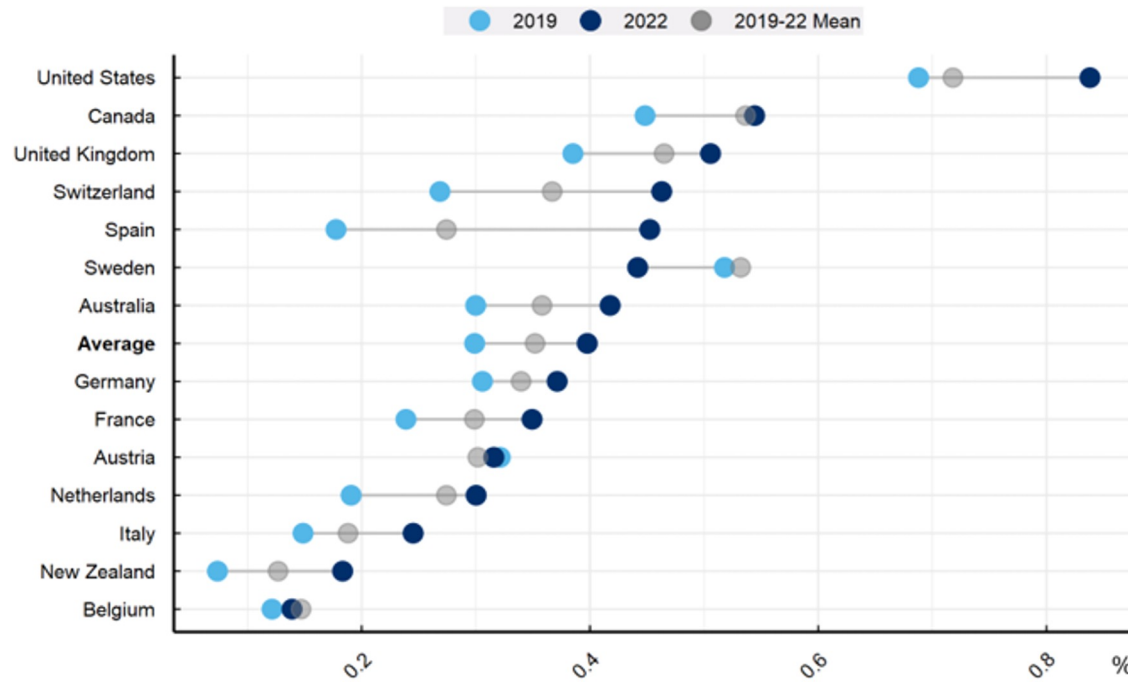


Source: [Lightcast](#)

# AI job postings have increased 33% on average

Figure 3.2. Trend in the share of online vacancies requiring AI skills, by country (2019-22)

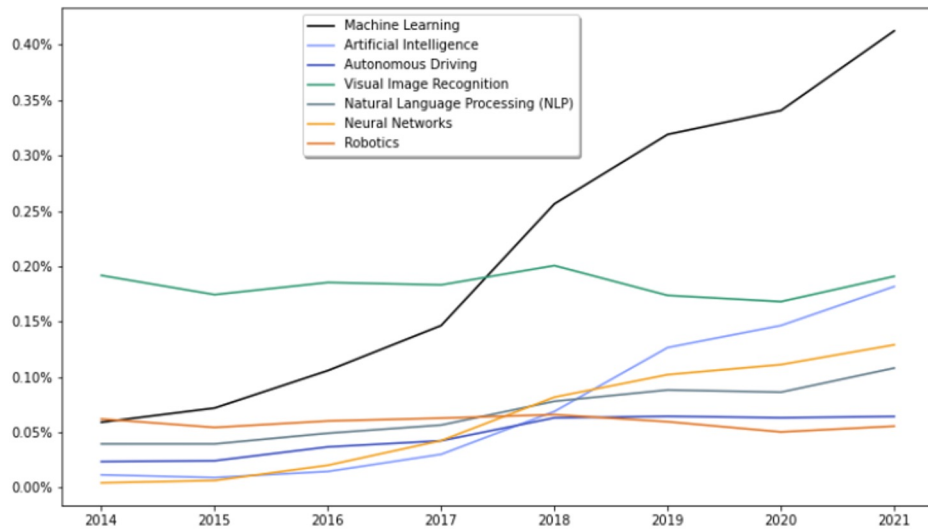
Percentage of online vacancies advertising positions requiring AI skills, by country



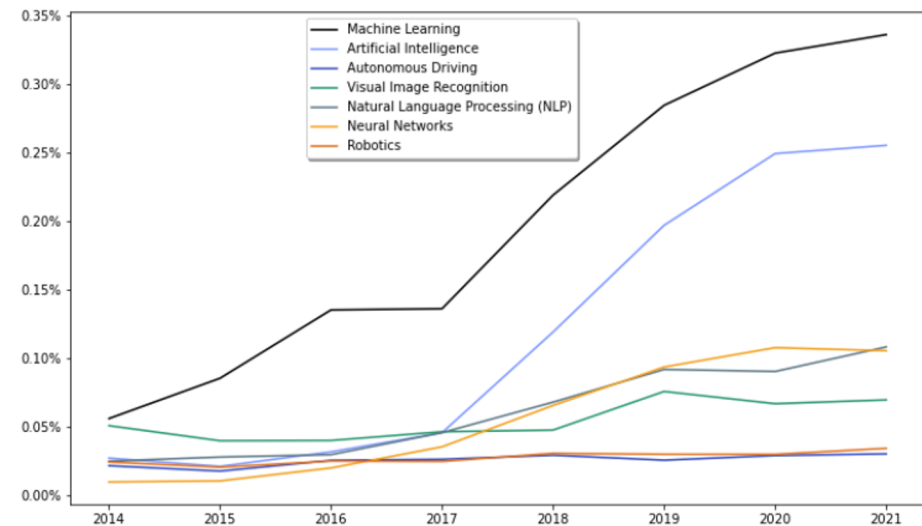
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# Most Demanded AI Is Not That “Intelligent”

AI Share of Total Postings, by Skill Cluster, DE, 2014-2021



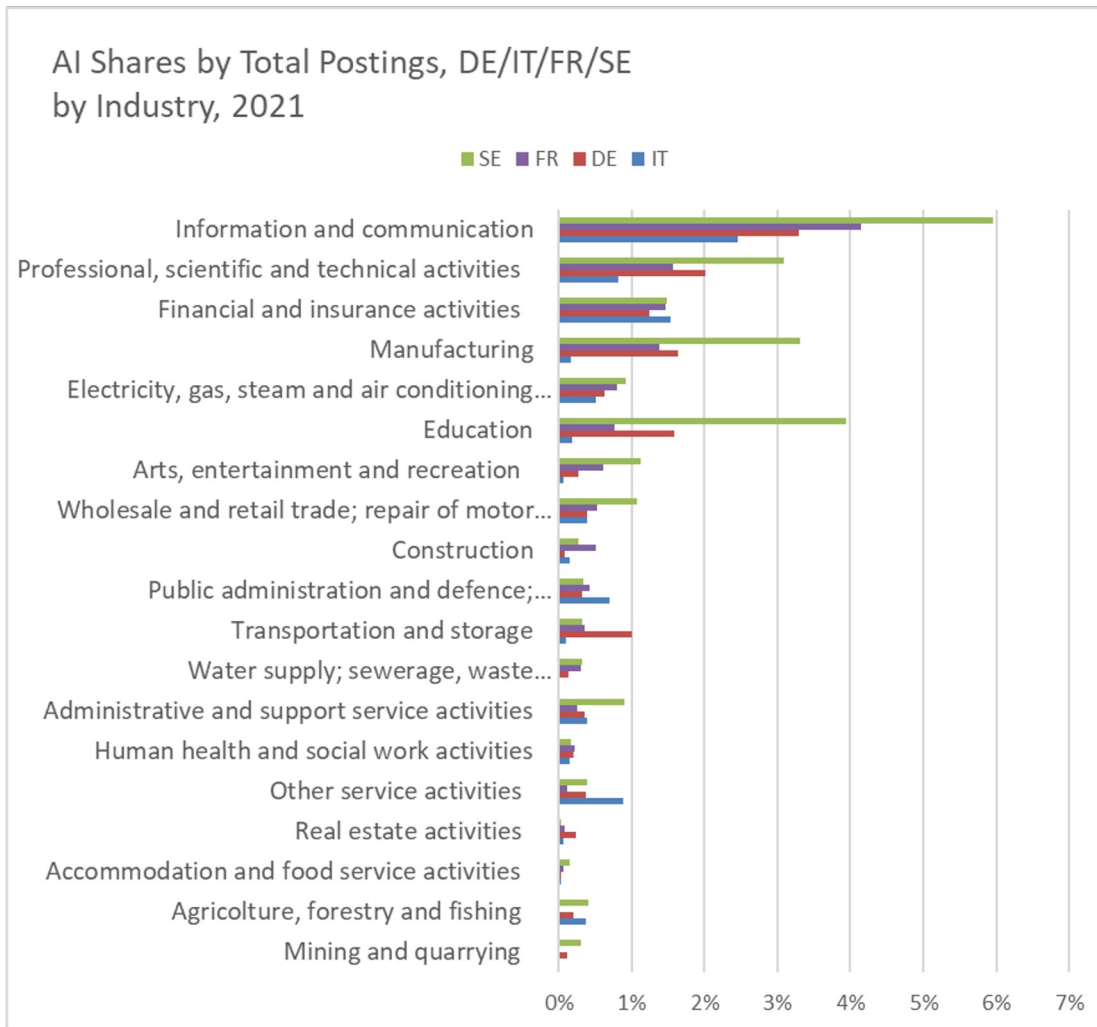
AI Share of Total Postings, by Skill Cluster, FR, 2014-2021



Source: Lightcast



# AI Diffusion across Industries, EU countries

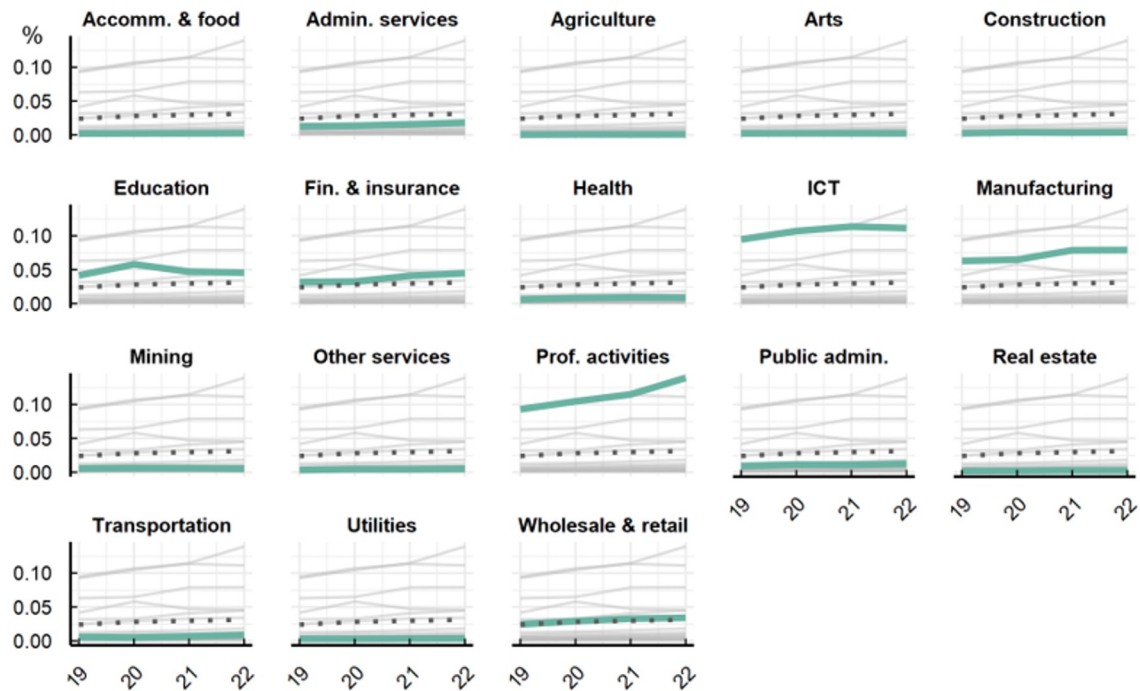




# Professional activities, ICT, and Manufacturing drive AI

Figure 3.3. Trend in the share of online vacancies requiring AI skills, by sector and year (2019-22)

Percentage of online vacancies advertising positions requiring AI skills, by sector and year

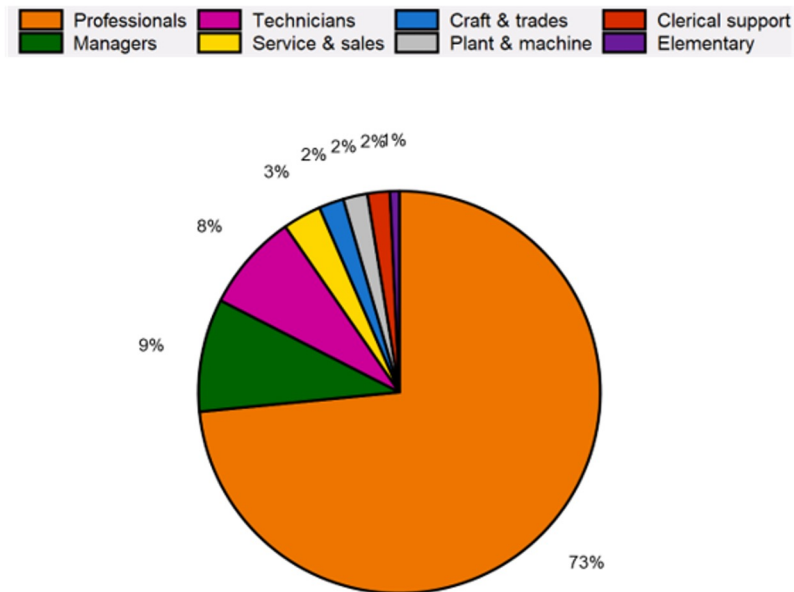


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# AI job postings are concentrated in Professionals and Managers

Figure 3.5. Online vacancies requiring AI skills in selected European countries, by occupation (2019-22)

Percentage of online vacancies advertising positions requiring AI skills in specific occupations

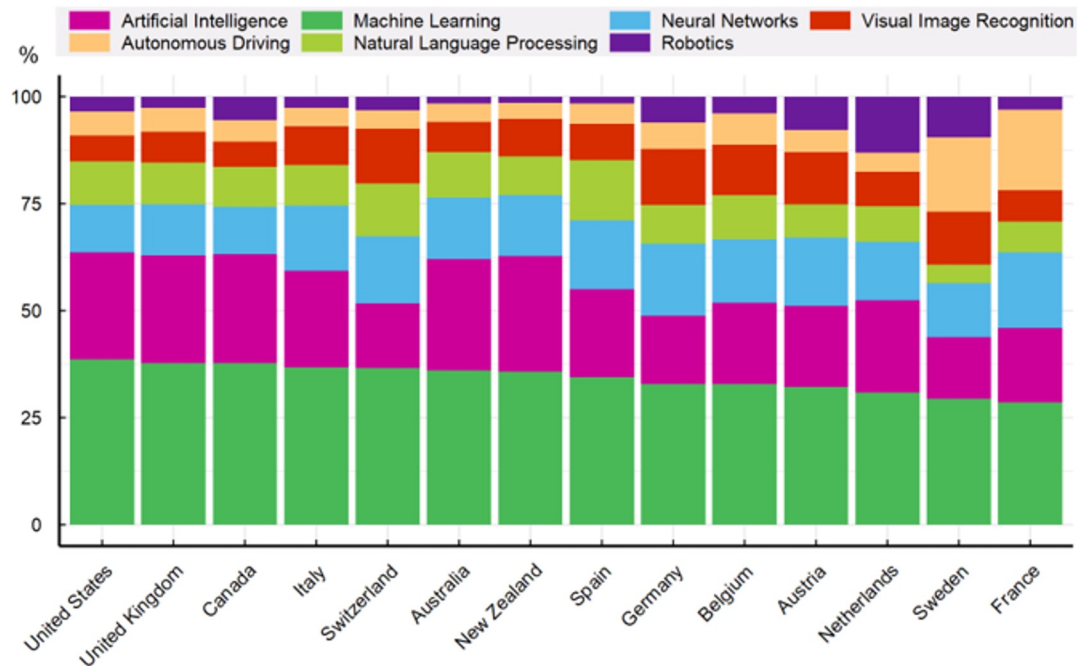


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# Key skill clusters include Machine Learning, AI, and Neural Networks

Figure 3.9. Geographical distribution of AI skills clusters, (2019-22)

Percentage of online vacancies requiring AI skills averaged across 2019-22, by skill cluster and country

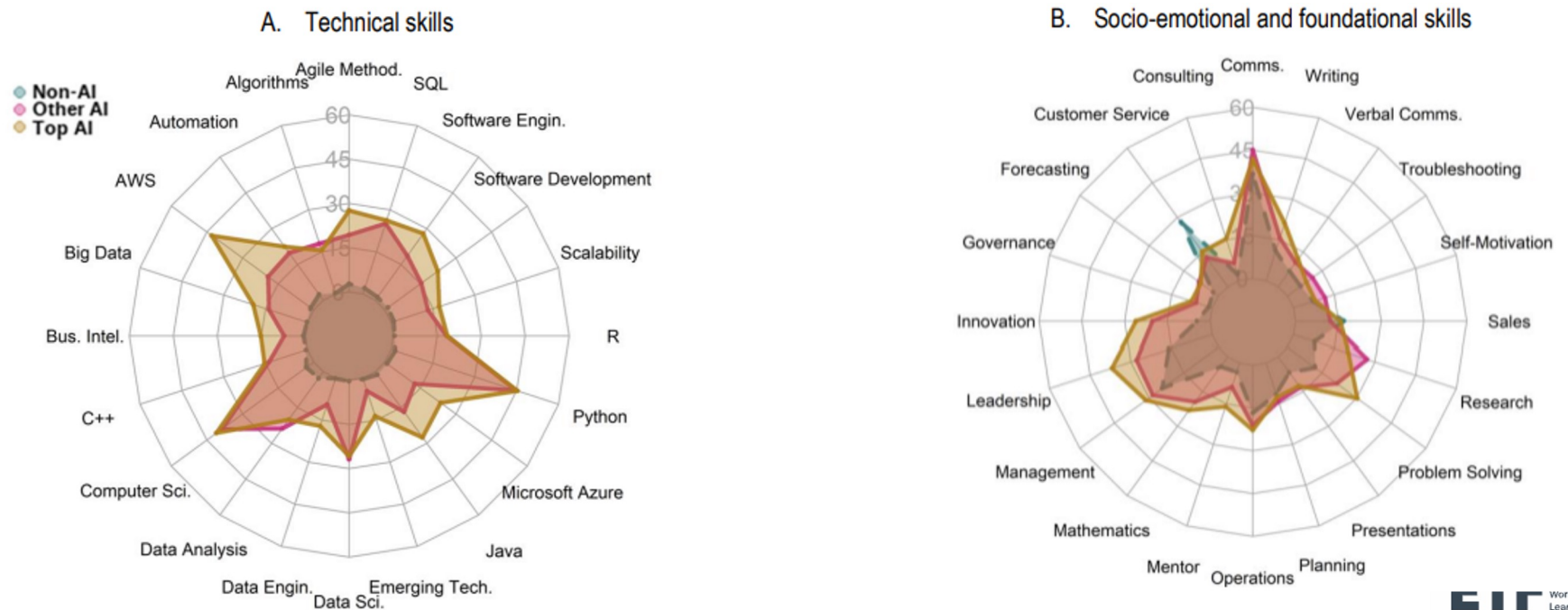


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# Python and AWS are highly in-demand technical skills, along with leadership and management in AI firms

Figure 4.5. Top 20 skills in AI job postings by top AI employers across industries (2022)

Percentage of AI online vacancies by top AI vs. other AI employers and percentage of non-AI online vacancies requiring specific skills, United States



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# AI Density & the AI Surface

## AI Density Definition

- **AI Density** refers to the **proportion of AI-related skills** within a given set of skills associated with selected occupations, a specific area, or a geographic region.
- It is calculated by dividing the number of AI skills by the total number of skills present in the selected domain or context.
- For example, if there are 100 skills identified within a set of occupations or a particular area, and 20 of those skills are directly related to artificial intelligence, then the AI Density would be calculated as:

$$\text{AI Density} = (\text{Number of AI skills}) / (\text{Total number of skills})$$

## Example

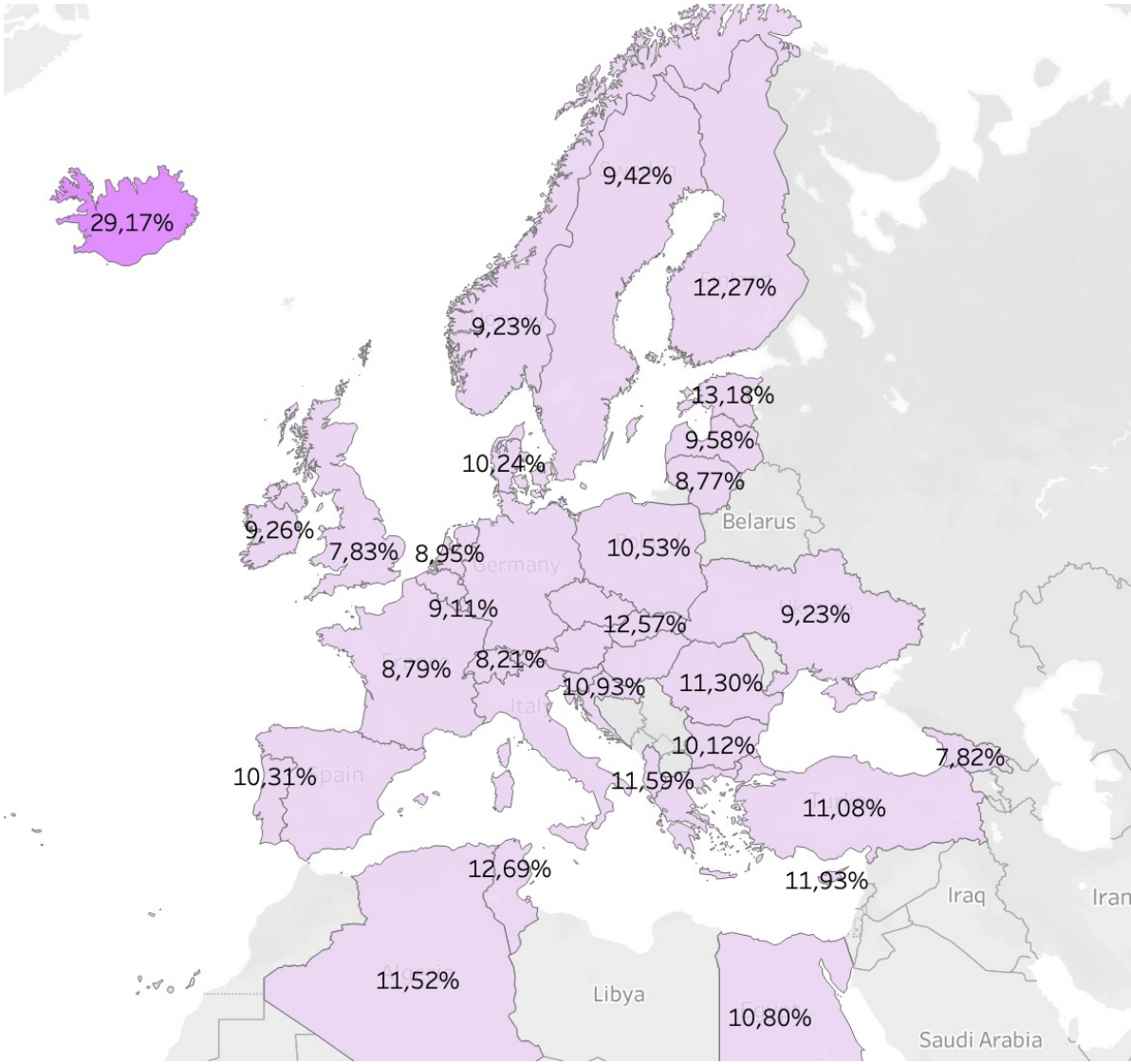
In this example:

> AI Density =  $20 / 100 = 0.2$  or 20%

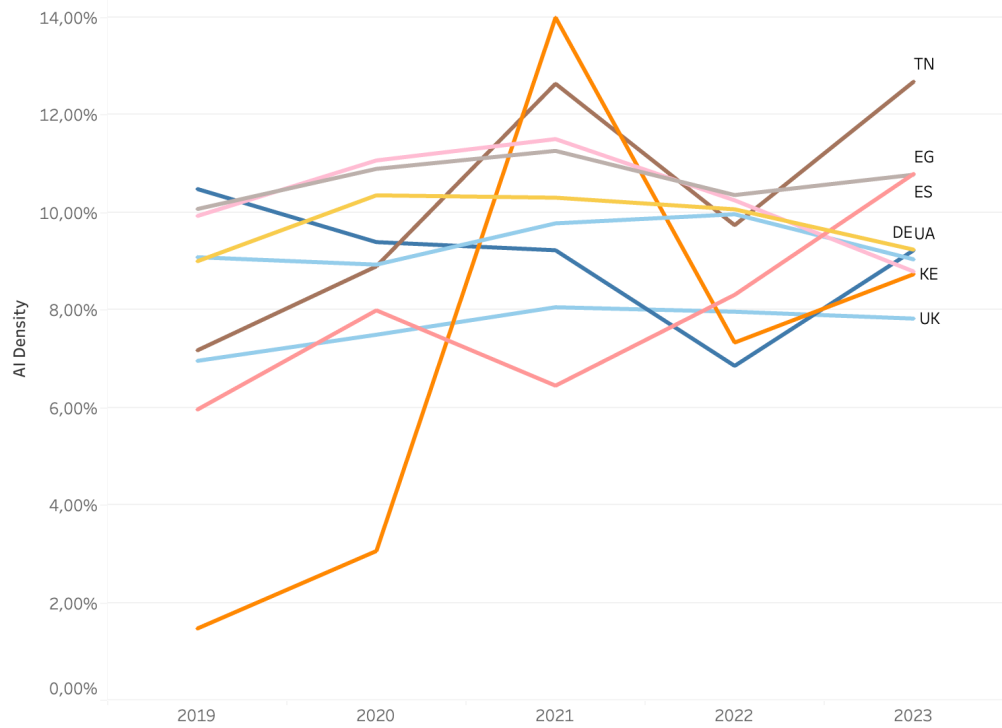
This means that 20% of the skills within the selected domain or context are related to artificial intelligence.

AI Density provides insights into **the prevalence and significance of AI** within specific industries, regions, or occupations, helping to gauge the level of integration and adoption of AI technologies in those areas.

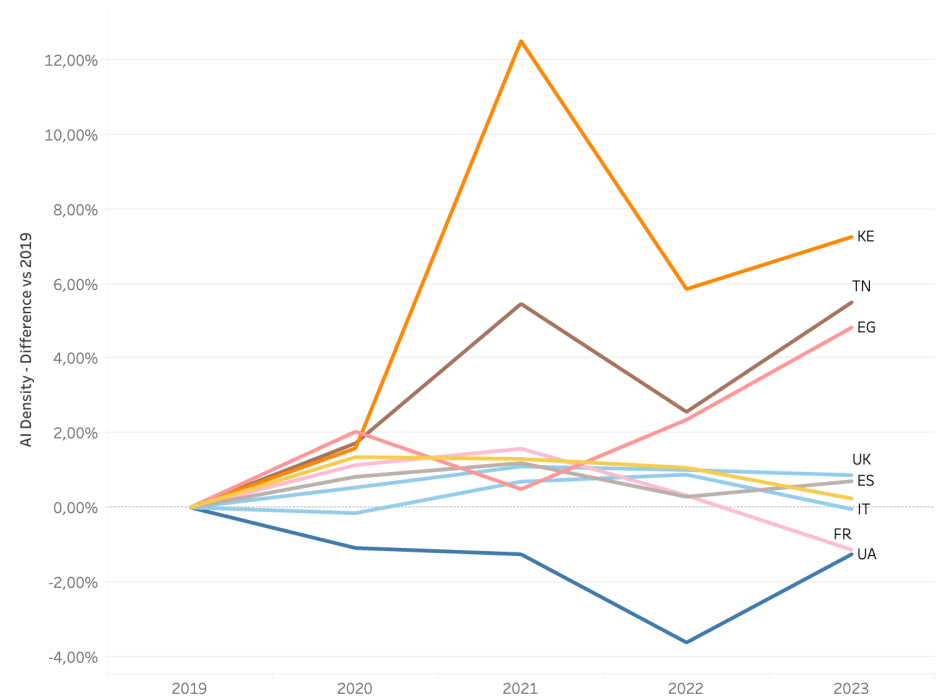
# AI Density







AI Density - 2023 vs 2019



# The AI Surface

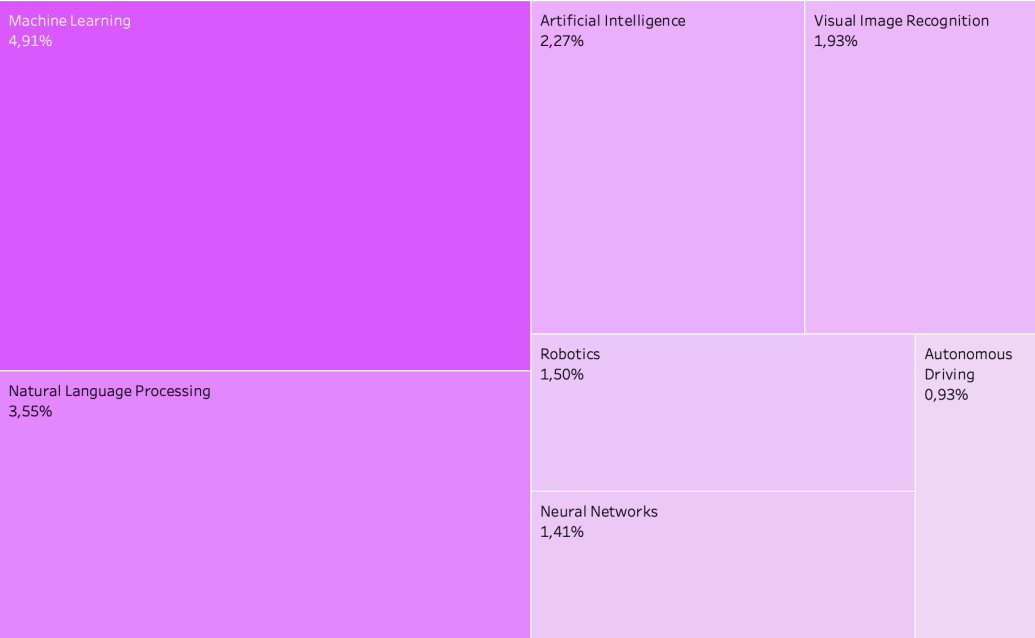
**AI Surface** refers to the breadth or scope of AI-related skills and technologies present within a given domain, area, or set of occupations.

While **AI Density** measures the proportion of AI skills relative to the total number of skills, **AI surface expands on this concept by considering not only the number of AI skills but also their diversity and applicability across various domains and functions.**

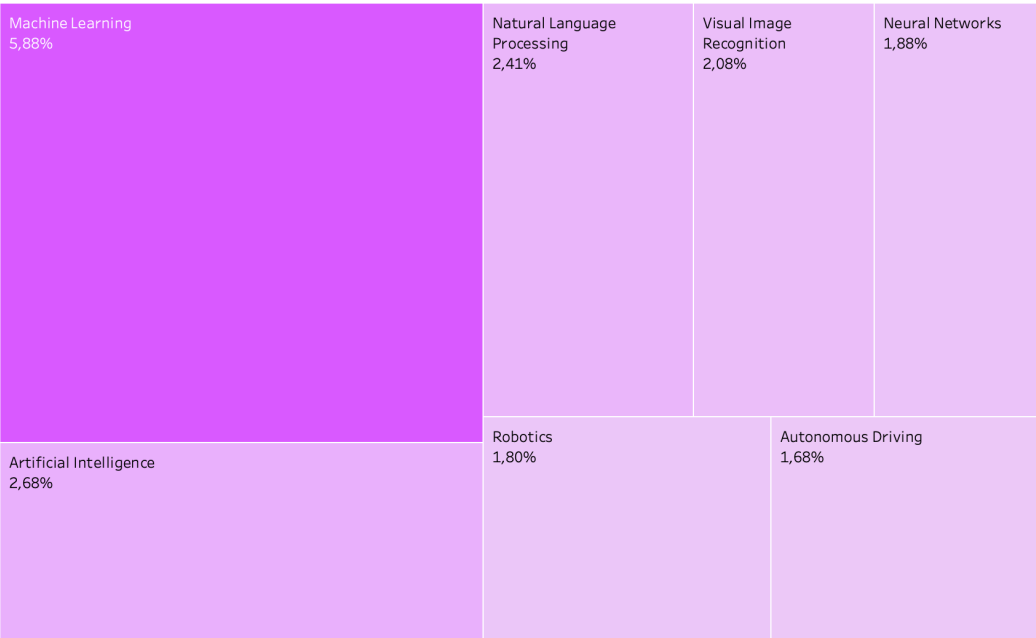
AI surface reflects the extent to which AI-related capabilities permeate a particular field or region. It encompasses a wide range of AI applications, methodologies, and techniques that are utilized within the context being studied.

# The AI Surface

AI Surface - DE - 2023

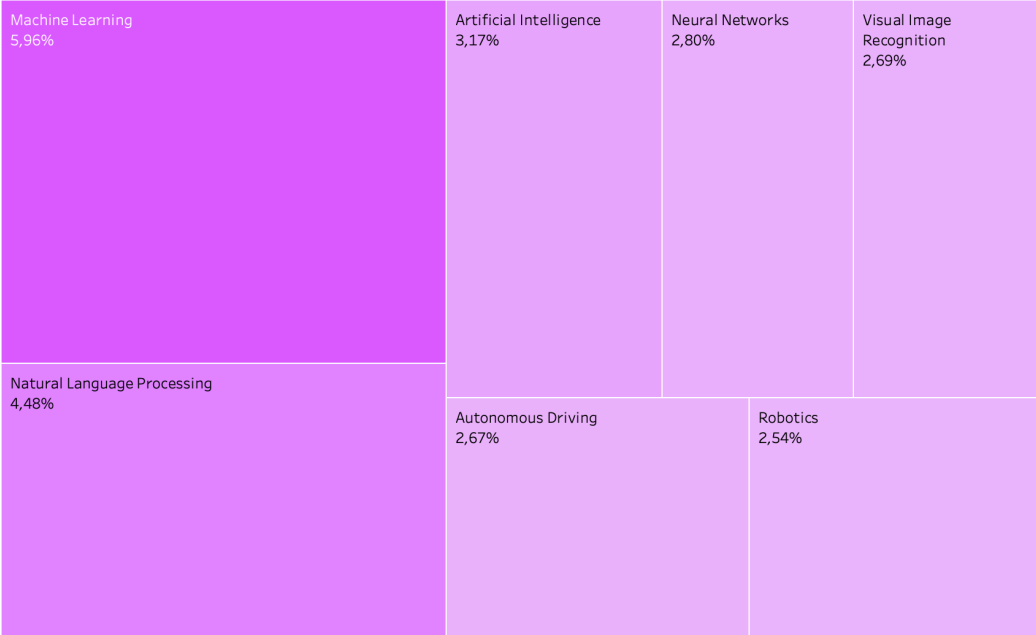


AI Surface - KE - 2023

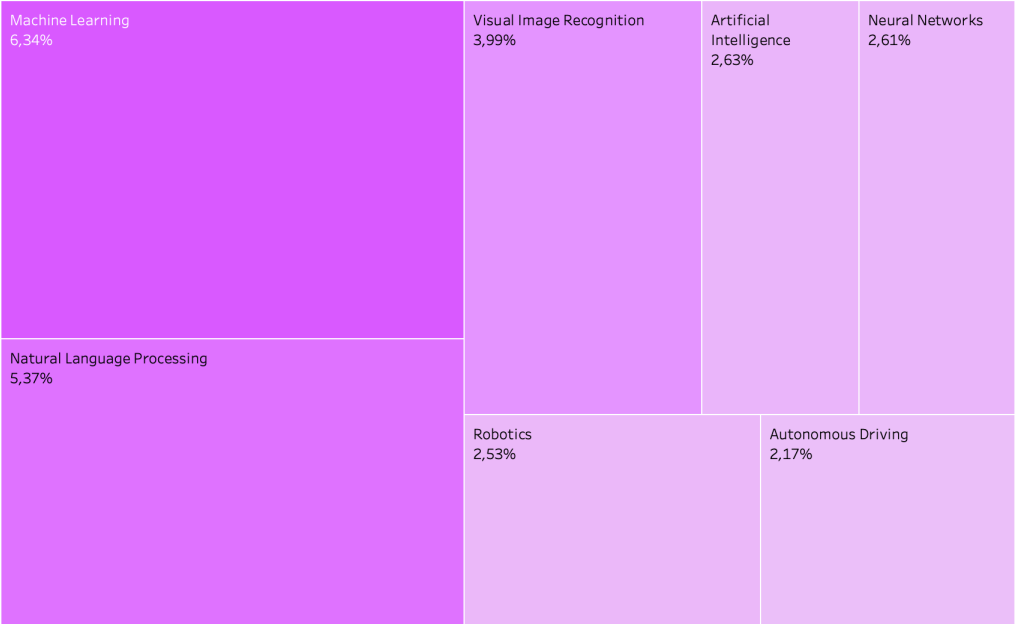


# The AI Surface

AI Surface - UA - 2023



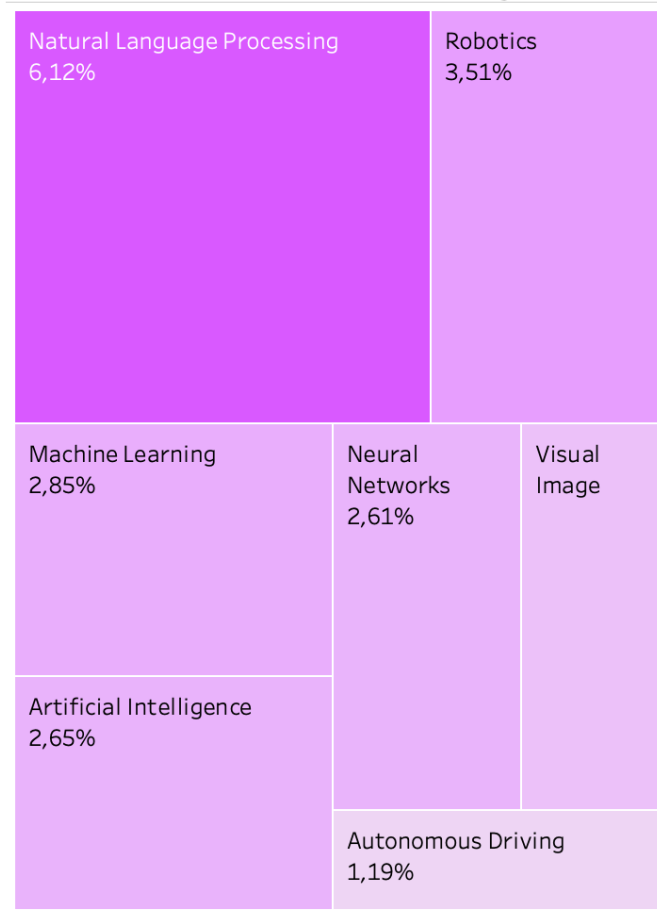
AI Surface - EG - 2023



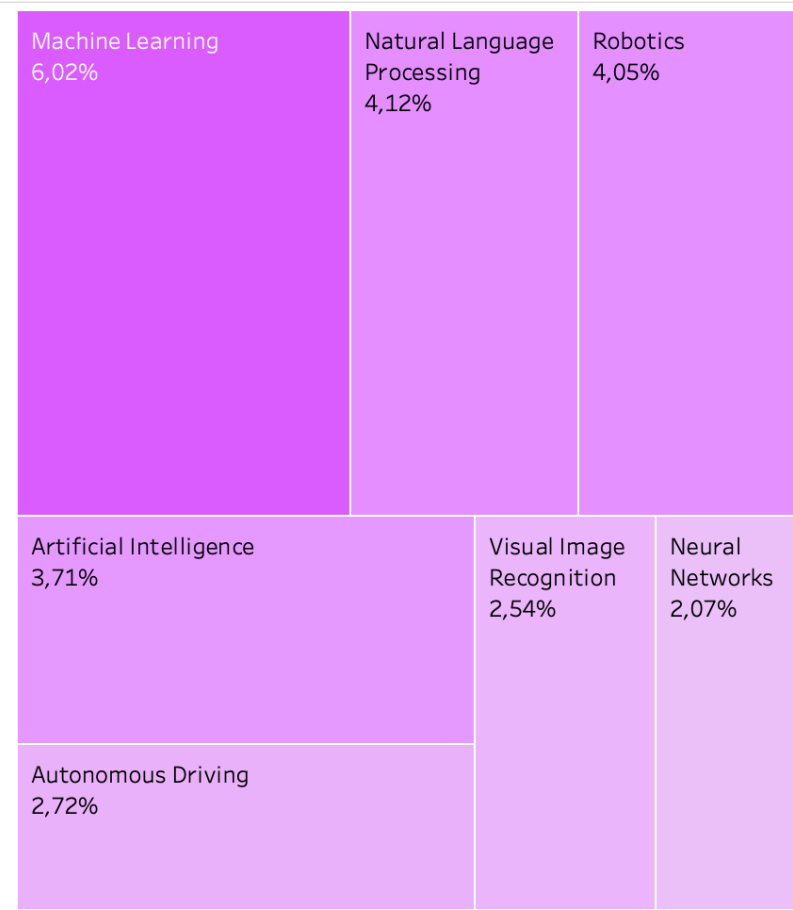
# The AI Surface by sector

AI Surface - UA - 2023

## Manufacturing

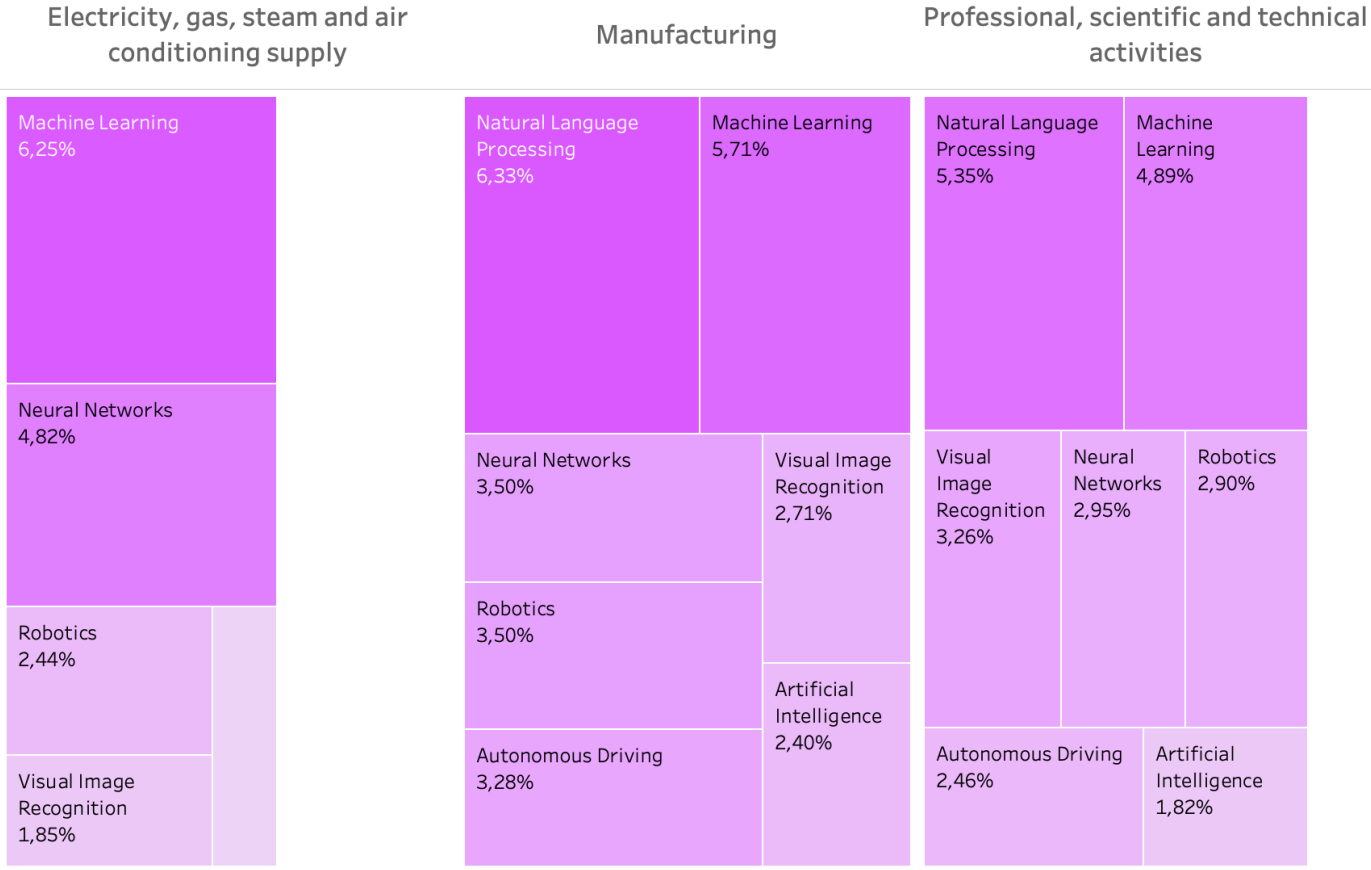


## Professional, scientific and technical activities



# The AI Surface by sector

AI Surface - EG - 2023





# Thanks !

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