AI and Future of Job Market

Tanya Roosta, Ph.D.
Applied Science Lead
at Alexa AI, Amazon

Sentiment on AI in News and Online

AI automation could impact 300MM jobs (Goldman Sachs on CNBC)

Which jobs will be most impacted by ChatGPT? (Visual Capitalist)

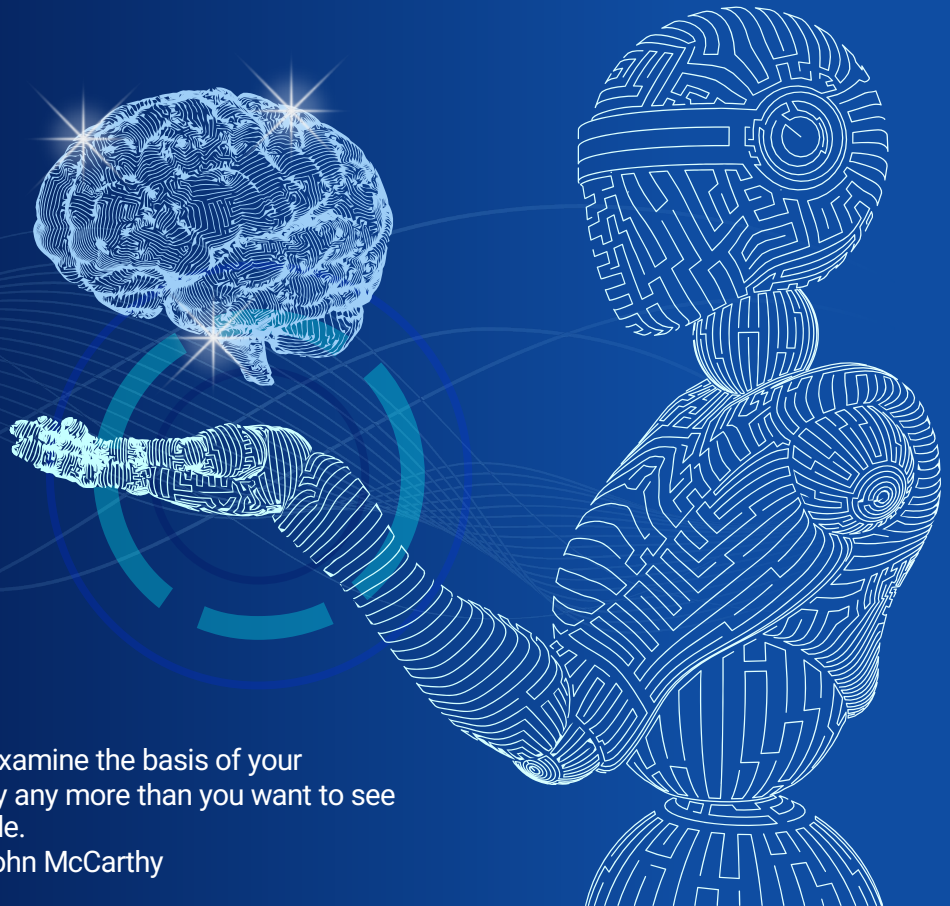
The disruptive economic impact of artificial intelligence (Forbes)

Is it all a hype, fact, or something in between?

Artificial Intelligence

The term Artificial intelligence (AI) was first coined in 1955 by John McCarthy, which he defined as **“the science and engineering of making intelligent machines”**

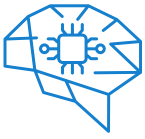
Other prominent leaders in AI:
Alan Turing
Marvin Minsky
Allen Newell



You don't want to examine the basis of your computer's morality any more than you want to see sausage being made.

-- John McCarthy

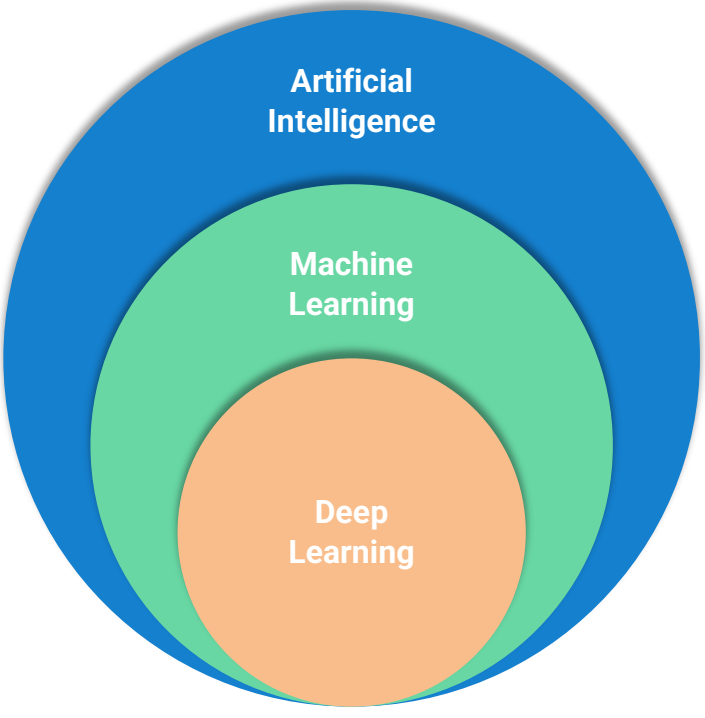
AI Subfields



Artificial Intelligence (AI)
Any technique that enables machine to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning.

Machine Learning (ML)
A branch of computational statistics that focuses on designing algorithms that can automatically and iteratively build analytical models from new data without explicitly programming the solution.

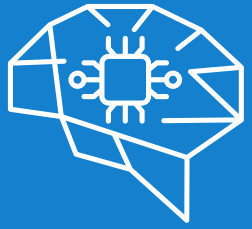
Deep Learning (DL)
A subset of machine learning composed of algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing multilayered neural network to vast amounts of data.



History of Artificial Intelligence

Artificial Intelligence (AI)

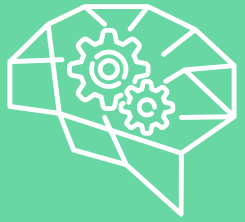
Early artificial intelligence stirs excitement.



"Engineering of making intelligent machines and programs."

Machine Learning (ML)

Machine learning begins to flourish.



"Ability to learn without being explicitly programmed."

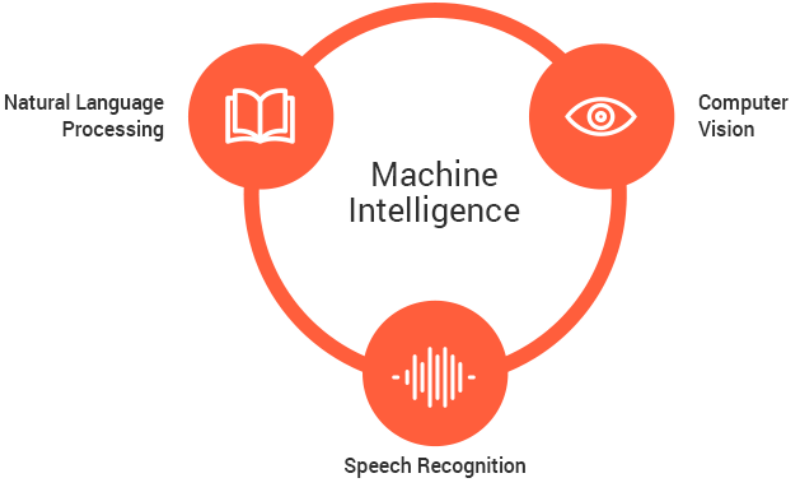
Deep Learning (DL)

Deep learning breakthroughs drive AI boom.

"Learning based on network."

1950's 1960's 1970's 1980's 1990's 2000's 2010's 2020's 2030's

Technologies Powered by ML and DL



Machine Learning

Machine learning is the crown jewel of AI

In recent years, the term machine learning and AI have been used interchangeably and sometimes ambiguously.

The power of AI comes from the use of ML.

Functions of machine learning:

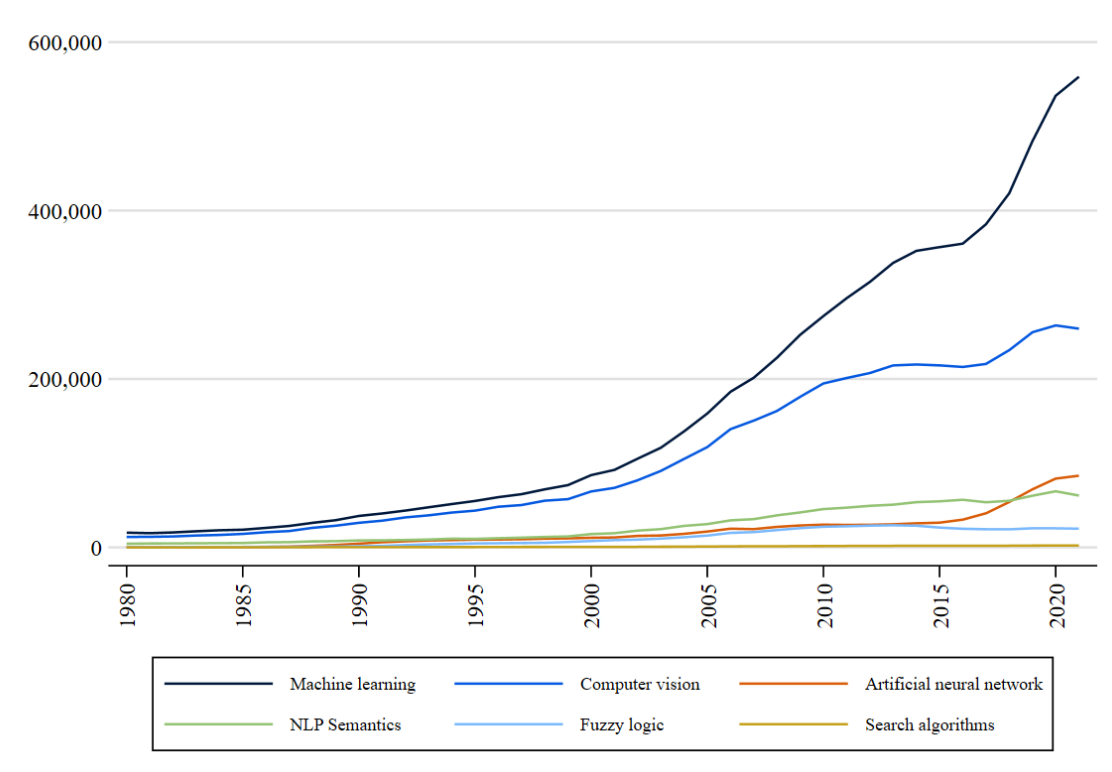
Descriptive: the system uses the data to explain what happened.

Predictive: the system uses the data to predict what will happen.

Prescriptive: the system will use the data to make suggestions about what action to take.

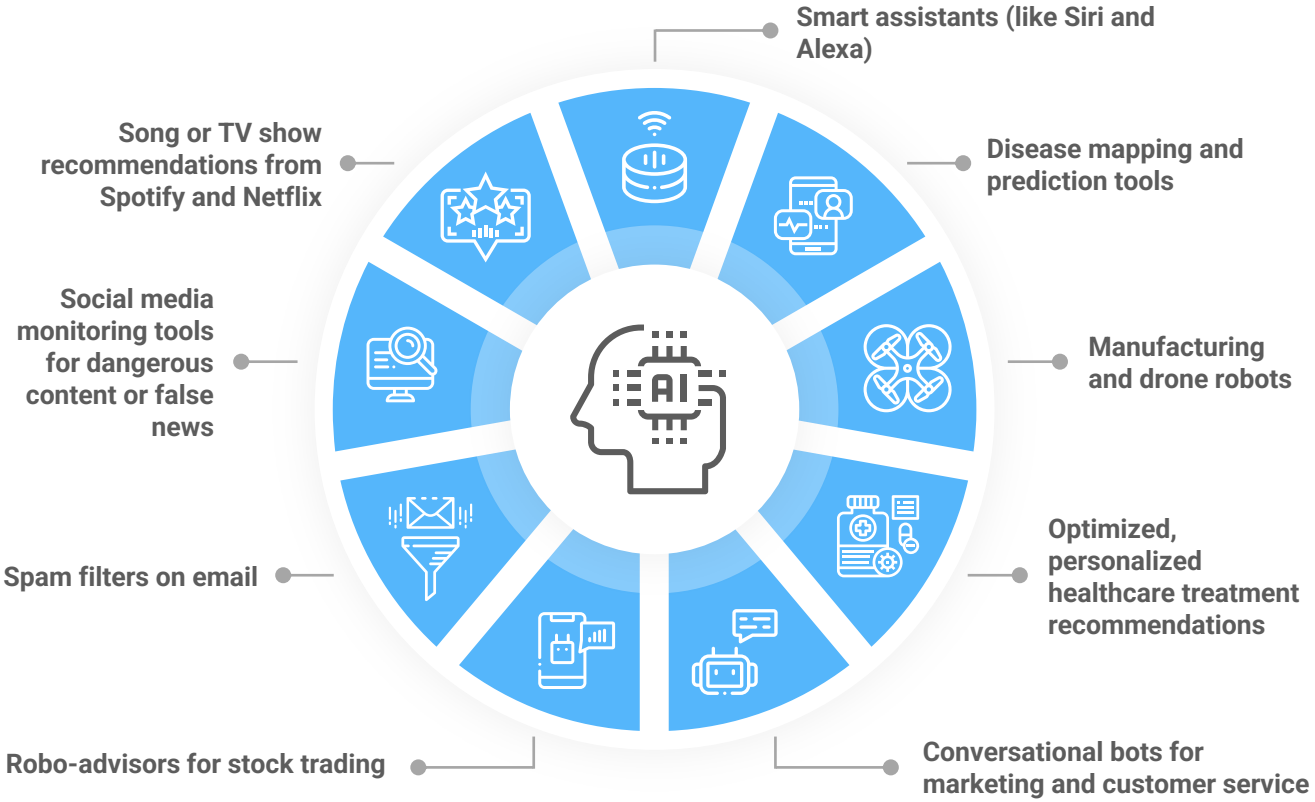
https://mitsloan.mit.edu/ideas-made-to-matter/machine-learning-explained

AI research publications by topic, 1980-2021



Reference: IECD: AI

Machine Learning Examples



Data Science and Machine Learning

- Data science studies data and how to extract meaning from it.
- Machine learning tries to understand and build models that utilize the data.
- Data science covers the entire spectrum of data processing, and not just the algorithmic aspects. As such, it is an umbrella term that encompasses machine learning.

Image reference: https://www.edureka.co/blog/data-science-vs-machine-learning/

Economic and Societal Opportunities and Challenges

With the continuous improvements in AI, the impact on the economy and society is inevitable:

- Benefits: Productivity, Growth, Market power, Innovation
- Challenges: Inequality, privacy violations, anti-competitive environments, perpetuating racial and other forms of bias, ethical concerns

> While these costs are substantial, they are often **not inherent** to AI, but very much a product of the choices made in the development and deployment of the technology, meaning that there is a central role for governments in the studying, monitoring, and regulating of AI, as evidenced by the United States AI Bill of Rights and the European Commission Artificial Intelligence Act.*

* Excerpt from: https://www.whitehouse.gov/wp-content/uploads/2022/12/TTC-EC-CEA-AI-Report-12052022-1.pdf

Understanding and Management of AI

The society as a whole needs to fully understand and manage any innovation to harness its full potential for sustained economic growth.

The issue with the current state of AI is that the society still lacks a proper understanding of the consequences, and proper ways of managing the risks, that leads to sustained growth.

The impact of AI on the workforce is, and will continue, to be enormous.

AI technologies have the potential to increase productivity of different firms, create new types of jobs, and raise overall standard of living.
At the same time, AI will disrupt large pool of jobs and tasks, that have been strictly the domain of humans.

There will be substantial, and difficult, adjustments for workers as the types of jobs change and require different types of skills.

AI Adoption and Impact on Gas and Oil Industry

According to a recent survey by Ernst & Young, 92% of the global oil and gas companies are either currently investing in AI or plan to do so in the next 5 years.

The AI adoption has already shown very promising results:

- In 2021, PETRONAS deployed AVEVA Predictive Analytics in Microsoft Azure cloud.
- The goal was to predict and resolve equipment failures before they happen.
- Over 200 models were deployed over one year (much more than with human analysts).
- 51 major early warnings, 12 high impact, which delivered $17.4MM value (14X ROI).

Areas where AI is being used:

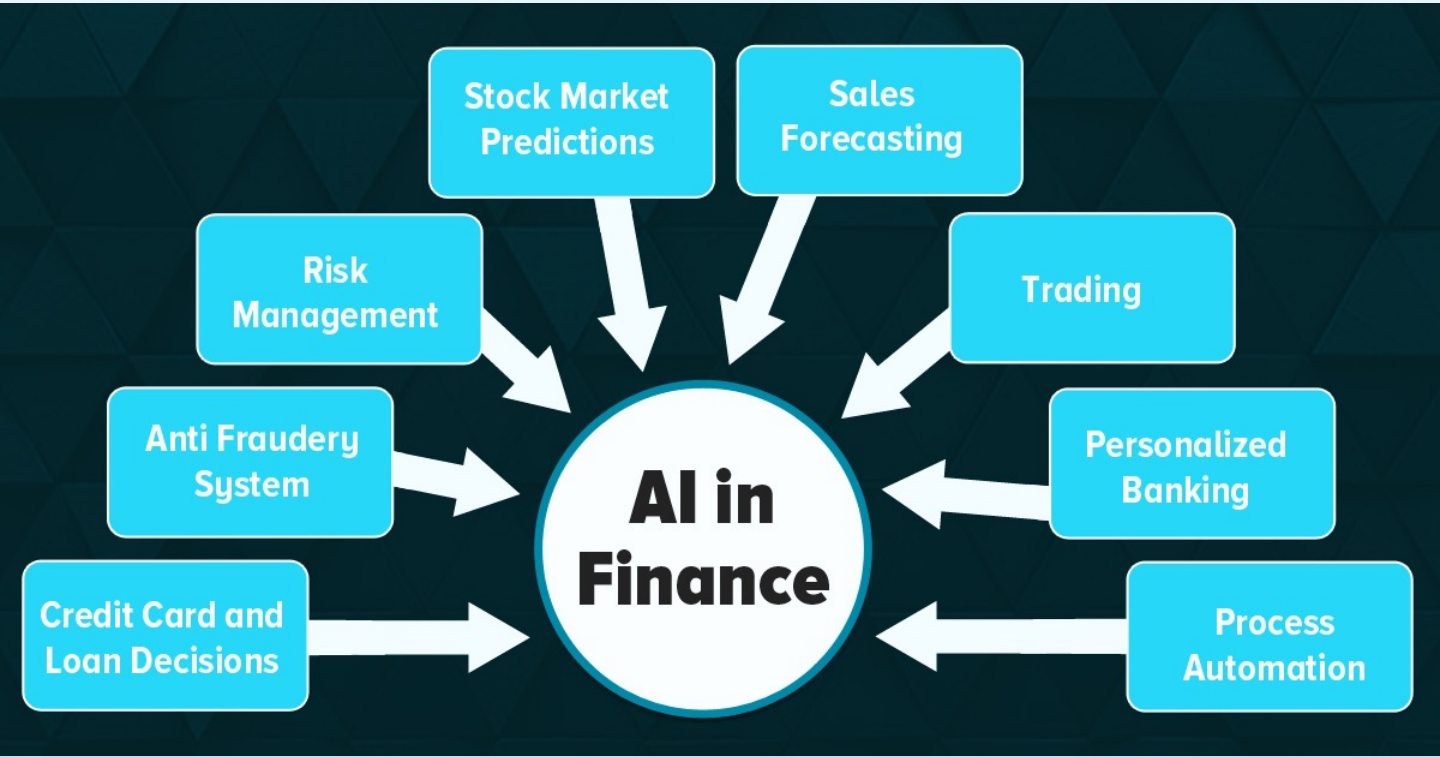
- Defect detection and enhanced quality assurance
- Ensure safety ad security standards
- Production and maintenance cost reduction
- Analytics based decision making
- Assistance with voice chatbots
- New insights in exploration
- Environmental benefits

AI Adoption and Impact on Financial Industry

The aggregated potential cost savings for banks from AI applications is estimated at $477B by the end of 2023, with front and middle office accounting for $416B of this number.

Some of the benefits of AI adoption:

- Enabling 24/7 customer interaction in a frictionless manner
- Reduction of repetitive work
- Lowering human error
- Improve security



ttps://www.aismartz.com/blog/use-cases-of-ai-in-the-finance-sector/

For potential cost savings associated with the adoption of AI technologies in other fields, you can take a look at:

https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-executives-ai-playbook?page=industries/

Concluding Thoughts

There has been a big debate even among prominent AI developers.

- Geoffrey Hinton leaving Google

Marissa Mayer (ex Yahoo CEO)*:
“I always think it’s better to engage with a problem than to estrange yourself. If you really think there is that much of an issue, the worst thing you can do is to leave”

“I think that you have to have a particular lens… if you say , look, we have a very clear lens where this is associated to humans, and puts humans in the middle of it, really thinking about, when should we use it on, like, life-and-death situations and other things like that? I think that can [lead to] very good outcomes. I also think that it’s important to realize that it’s got to be compared to reality, not perfection.”

* https://www.emergingtechbrew.com/stories/2023/05/04/marissa-mayer-ai-yahoo-regrets

Thank you for your time

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