Artificial Intelligence and Machine Learning

What is Artificial Intelligence (AI)?

One of the most exciting and fast growing research fields!

AI is the science and engineering of computer systems that can perform tasks requiring human intelligence or beyond.

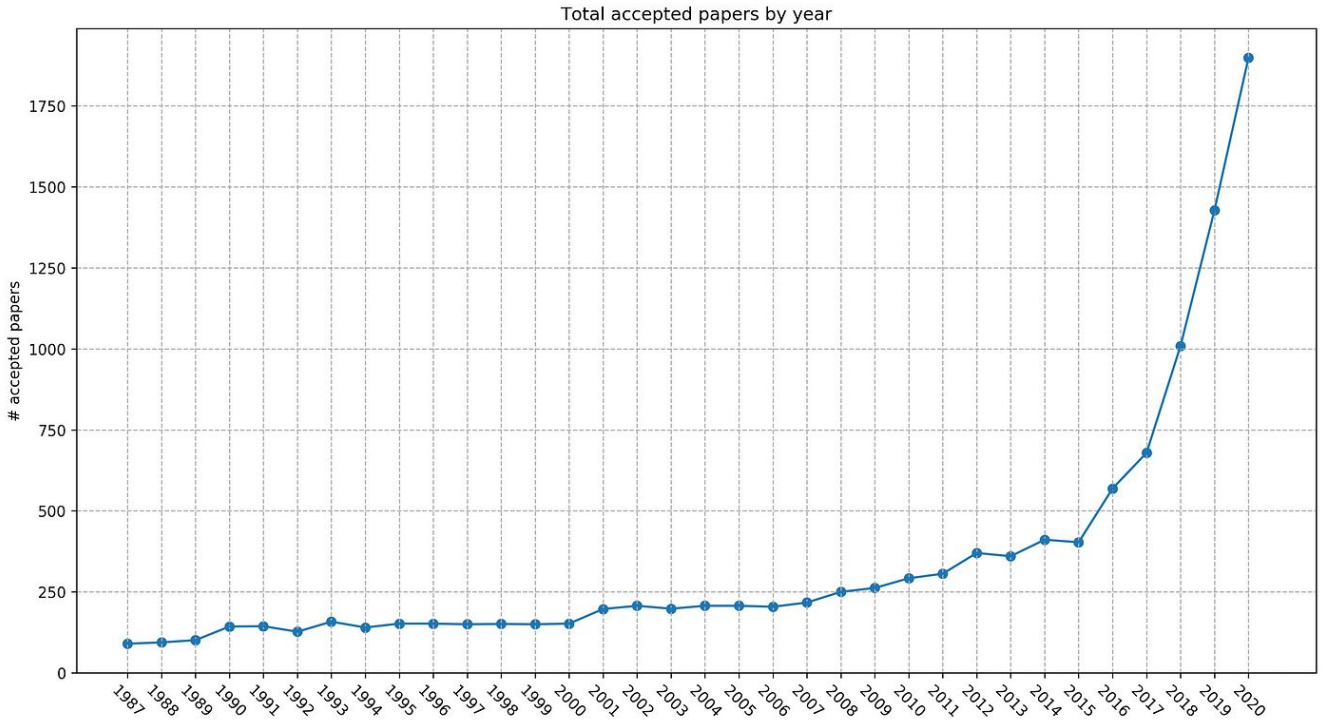
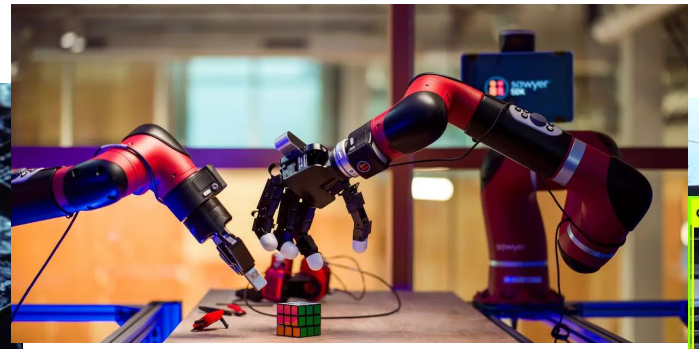


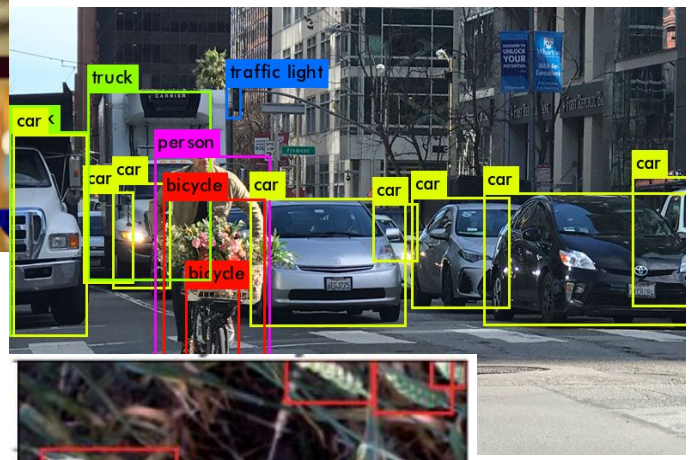
Image from https://towardsdatascience.com/neurips-conference-historical-data-analysis-e45f7641d232

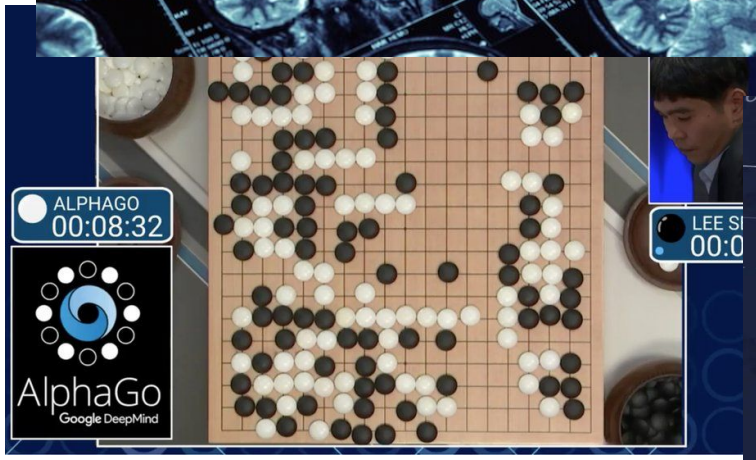
Where is AI?

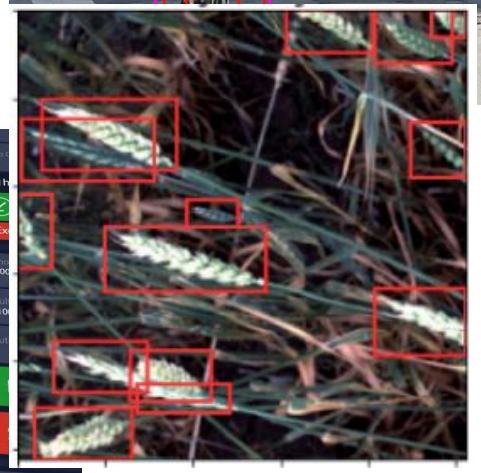
Where is AI?



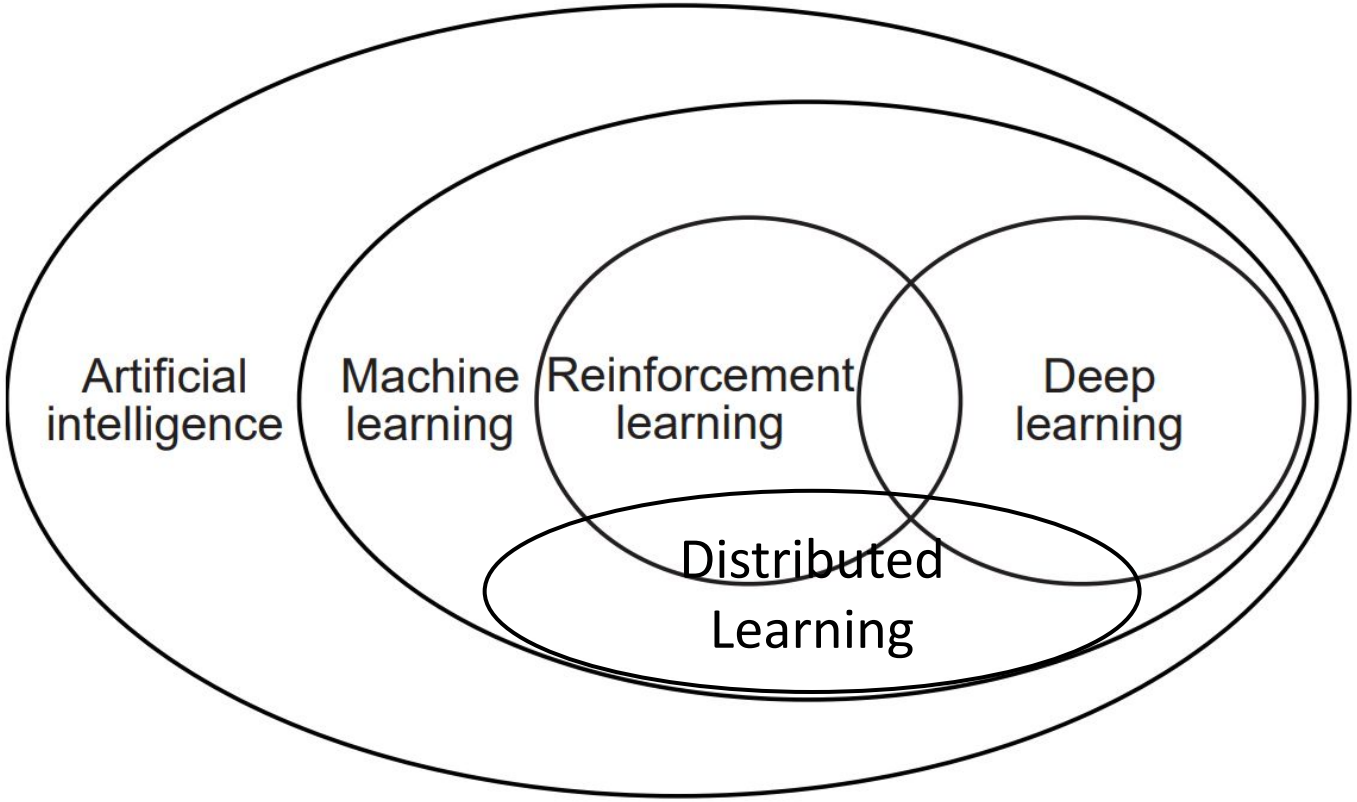
Everywhere!







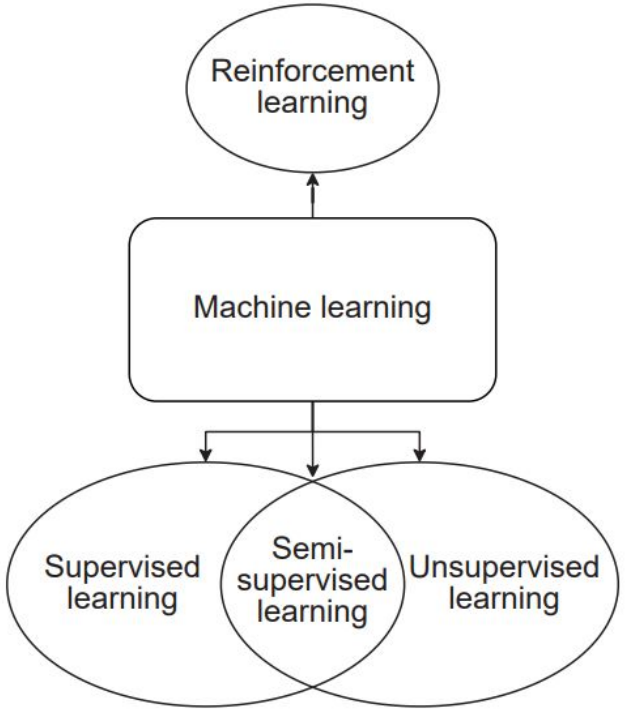
Types of AI



Fourati, F., & Alouini, M. S. (2021). Artificial intelligence for satellite communication: A review. *Intelligent and Converged Networks*, *2*(3), 213-243.

Machine Learning (ML)

In contrast to symbolic AI, where the machine is provided with all the rules to solve a certain problem, in ML the machine is provided with the context (data) to learn the rules by itself to solve the issue.



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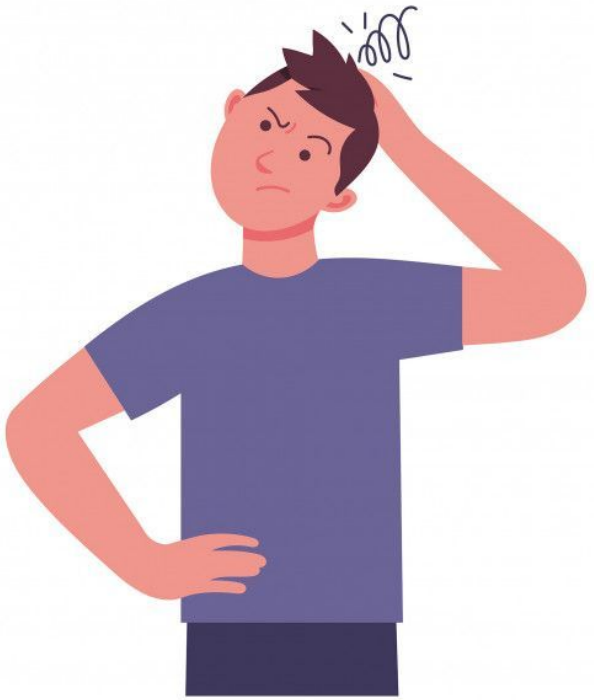
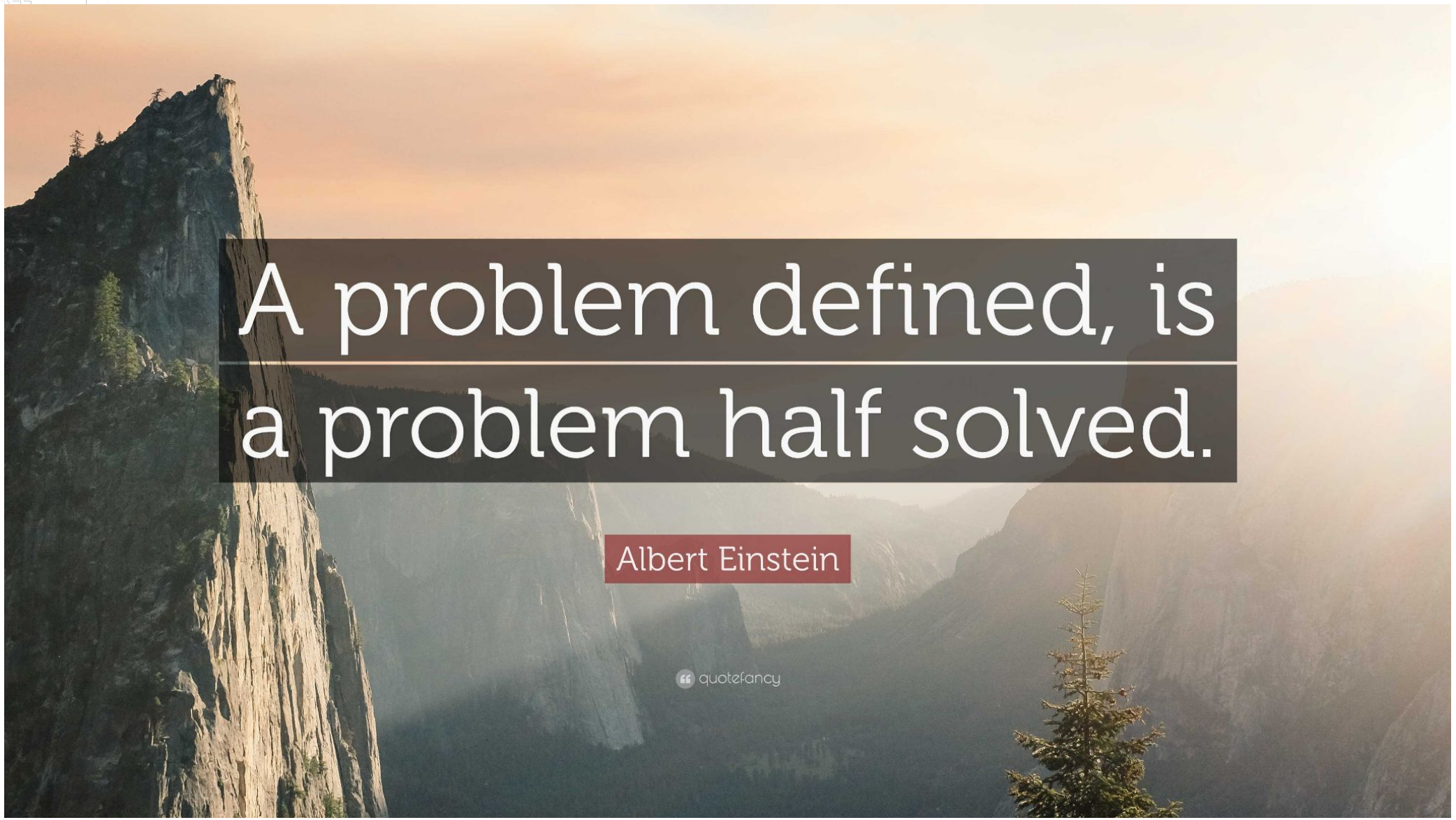
The goal of most ML problems

$$\min_{\theta} \mathbb{E}\left[\mathcal{L}(\theta)\right].$$



Most machine learning problems reduce to minimizing a problem-related function. These functions are called loss, cost, error, and regret functions.


A problem defined, is a problem half solved.
Albert Einstein
quotefancy

Problem Solving Strategy

Understand the problem.

Find which function that can capture the problem.

Minimize that function!

It is okay if you do not know or forget something! Just Google it!

Course Outline:

Machine Learning:

Linear Regression

Logistic Regression

Deep Learning:

Neural Networks

Applications