



CTU

CZECH TECHNICAL
UNIVERSITY
IN PRAGUE



AI introduction

Master. Cesar Sinchiguano

Robotics and cybernetics

Today's lecture

What is AI?

Introduction to Artificial Intelligence
Levels

History of Artificial Intelligence

Goals of Artificial Intelligence

Subfields of Artificial Intelligence

Types of Artificial Intelligence

AI vs Machine Learning

Where is AI used? Examples

Why is AI booming now?



What is Artificial Intelligence (AI)?

AI is a branch of computer science that studies machine intelligence.

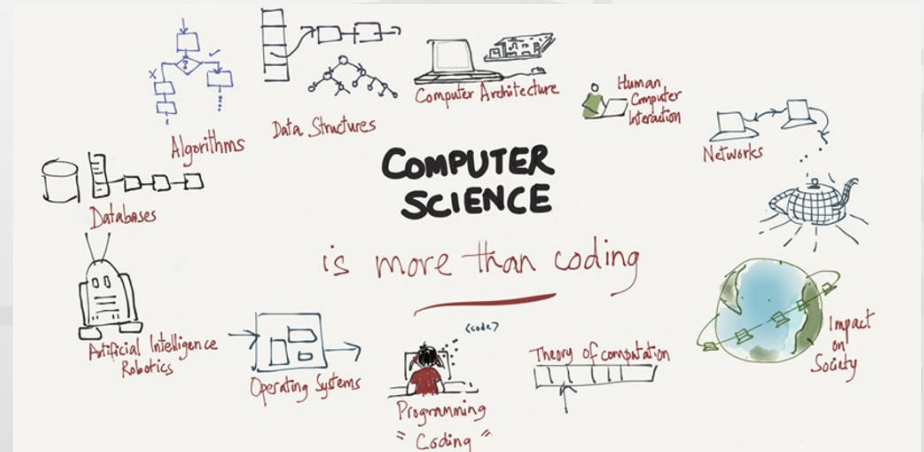
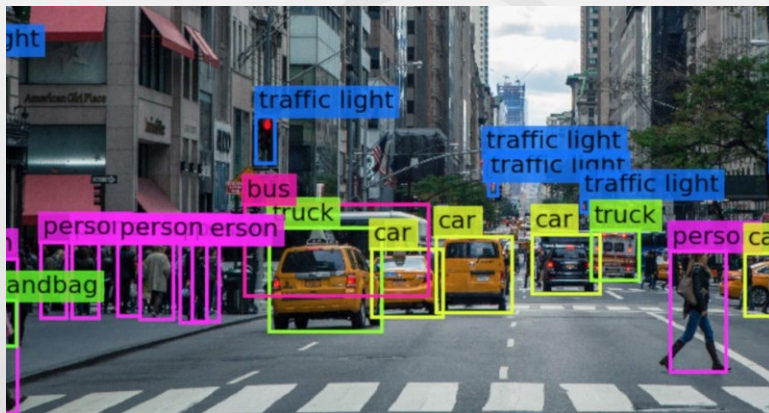
AI is a machine's ability to perform cognitive functions as humans do, such as perceiving, learning, reasoning, and solving problems.

AI is defined as the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

computerVision



The benchmark for AI is the human level concerning in teams of reasoning, speech, and vision.



Cognitive: relating to the processes of thinking and reasoning

Introduction to Artificial Intelligence Levels

In a nutshell,

AI provides cutting-edge technology to deal with complex data that a human being cannot handle.

AI automates redundant jobs allowing a worker to focus on the high level, value-added tasks.

When AI is implemented at scale, it leads to cost reduction and revenue increase.



drones_farms



Self-driving

History of Artificial Intelligence

In a nutshell,

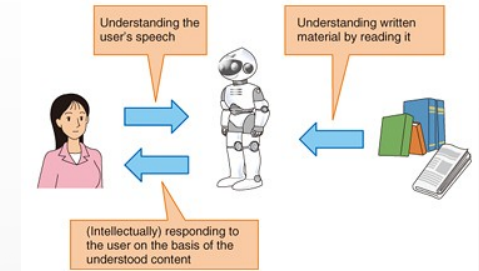
1956 John McCarthy first used the term Artificial Intelligence. Demonstration of the first running AI program at Carnegie Mellon University.

1964 Danny Bobrow's dissertation at MIT showed how computers could understand natural language.

1969 Scientists at Stanford Research Institute Developed Shakey. A robot equipped with locomotion and problem-solving.



[Link 1](#)



1979 The world's first computer-controlled autonomous vehicle, Stanford Cart, was built.



[Link 2](#)

History of Artificial Intelligence

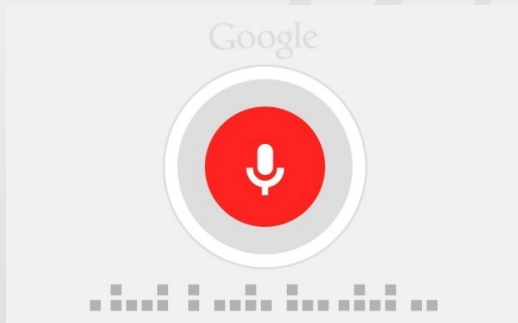
In a nutshell,

1997 The Deep Blue Chess Program beat the then world chess champion, Garry Kasparov.

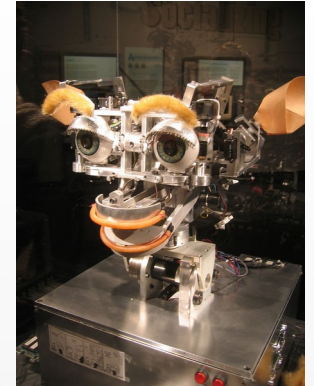
2000 Interactive robot pets have become commercially available. MIT displays Kismet, a robot with a face that expresses emotions.

2006 AI came into the Business world in the year 2006. Companies like Facebook, Netflix, Twitter started using AI.

2012 Google has launched an Android app feature called “Google now”, which provides the user with a prediction.



[Link4](#)



[Link 3](#)



Cognitive: relating to the processes of thinking and reasoning

Goals of Artificial Intelligence

Here are the main Goals of AI:

It helps you reduce the amount of time needed to perform specific tasks.

Making it easier for humans to interact with machines.

Facilitating human-computer interaction in a way that is more natural and efficient.

Improving the accuracy and speed of medical diagnoses.

Helping people learn new information more quickly.

Enhancing communication between humans and machines.



Accuracy: the fact of being exact or correct

Watson IBM

Robotic Arm Picking Apples



Link5



Subfields of Artificial Intelligence



Machine Learning

A subset of AI that uses computer algorithms to analyze data and make intelligent decisions based on what it has learned, without being explicitly programmed

Trained with large sets of data



They do not follow rules-based algorithms

They learn from examples

Machine Learning models can learn by example

- Algorithms learn rules from labelled examples
- A set of labelled examples used for learning is called training data.
- The learned rules should also be able to generalize to correctly recognize or predict new examples not in the training set.

Audio signal

Output text



How do I
get to Ann
Arbor?



Hello!

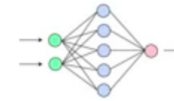


Please order
me a pizza.



Deep Learning

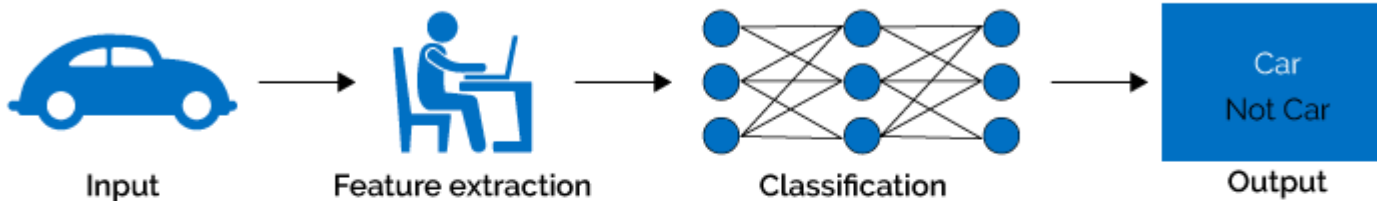
A specialized subset of Machine Learning that uses layered neural networks to simulate human decision-making



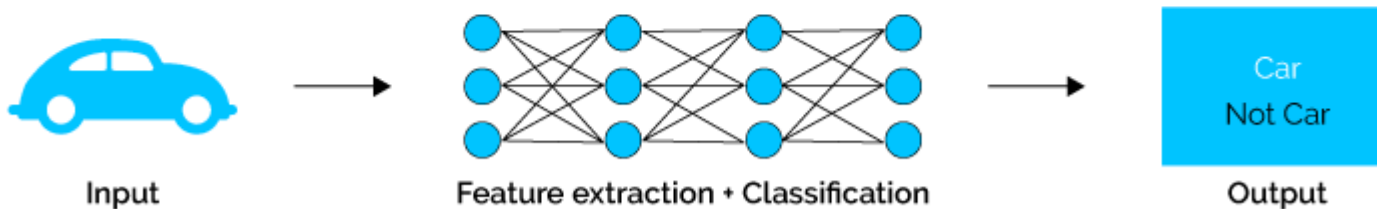
Neural Networks

Take inspiration from biological neural networks, although they work quite a bit differently

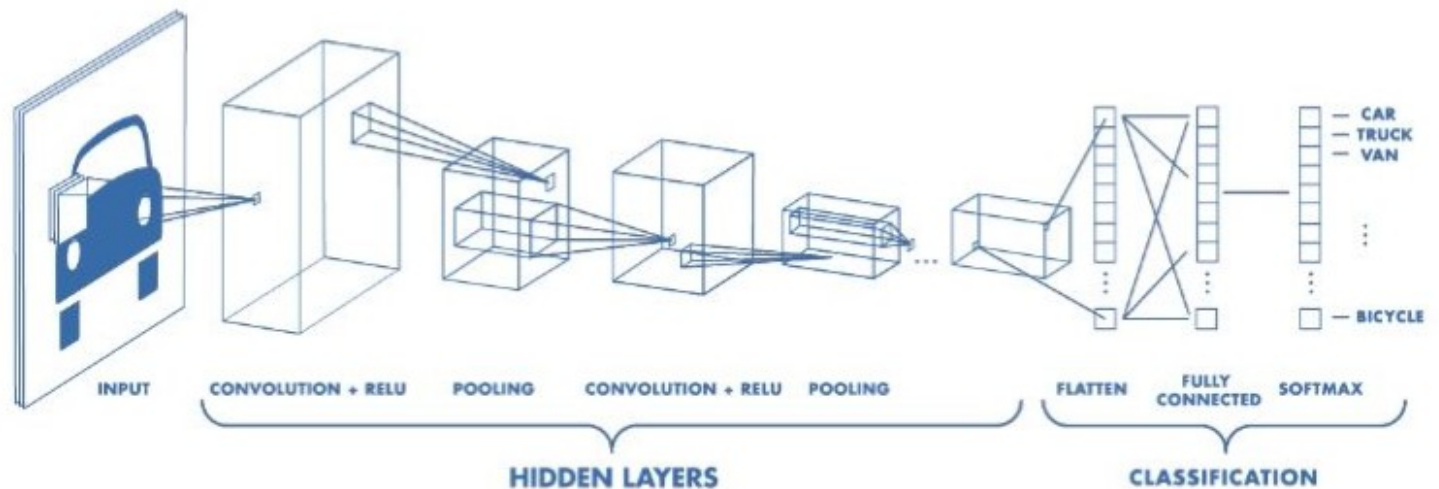
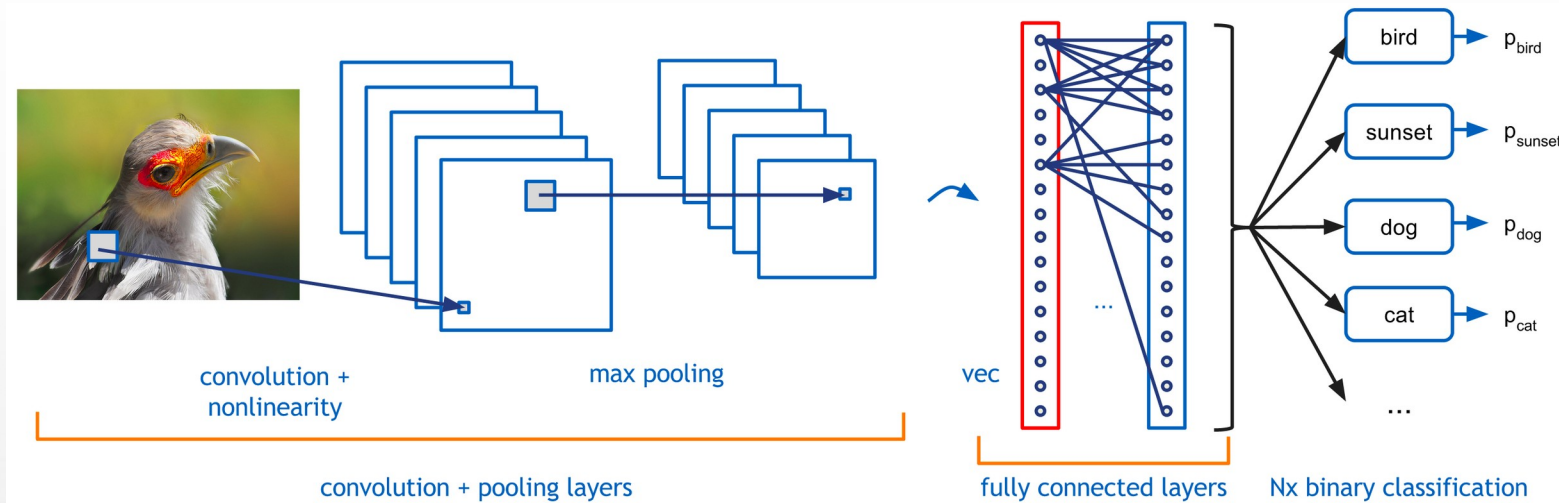
Machine Learning



Deep Learning



Deep Learning





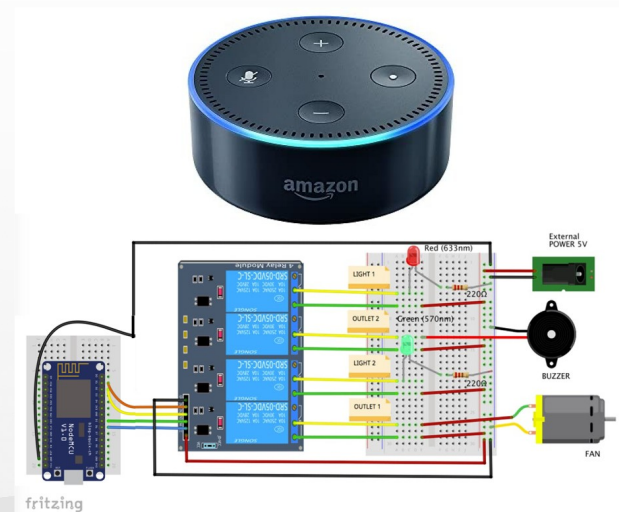
Natural Language Processing



Speech to text



Text to speech



NLP is a science of reading, understanding, and interpreting a language by a machine. Once a machine understands what the user intends to communicate, it responds accordingly.

NLP concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

NLP drives computer programs that translate text from one language to another, respond to spoken commands, and summarize large volumes of text rapidly—even in real time.

Accordingly: in a way that is suitable or right for the situation

Concerned: involved or worried

Types of Artificial Intelligence

3 Types of Artificial Intelligence

Artificial Narrow Intelligence (ANI)



Stage-1

Machine Learning

- Specialises in one area and solves one problem



Siri



Alexa



Cortana

Artificial General Intelligence (AGI)



Stage-2

Machine Intelligence

- Refers to a computer that is as smart as a human across the board

Artificial Super Intelligence (ASI)



Stage-3

Machine Consciousness

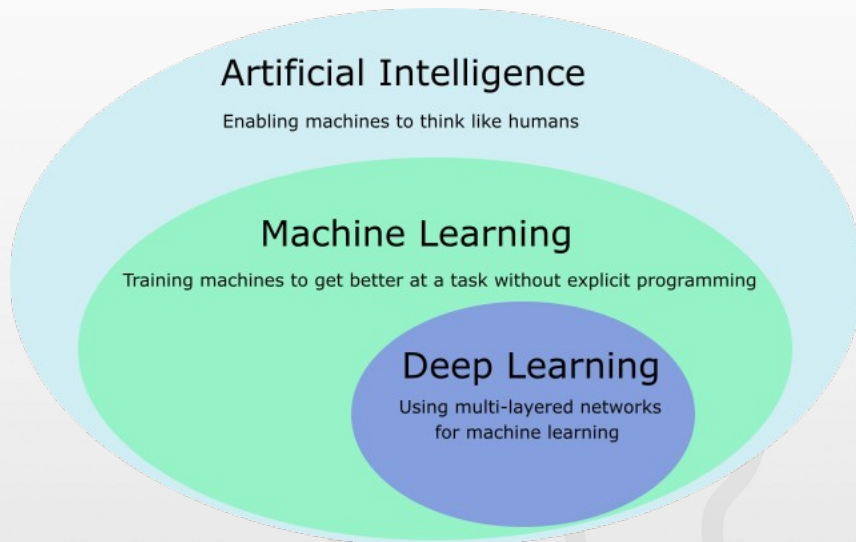
- An intellect that is much smarter than the best human brains in practically every field

Asimo Honda



AI vs Machine Learning

Artificial intelligence is a technology using which we can create intelligent systems that can simulate human intelligence



	Deep Learning	Machine Learning
Data	Needs a big dataset	Performs well with a small to a medium dataset
Hardware requirements	Requires machines with GPU	Works with low-end machines
Engineering peculiarities	Needs to understand the basic functionality of the data	Understands the features and how they represent the data
Training time	Long	Short
Processing time	A few hours or weeks	A few seconds or hours
Number of algorithms	Few	Many
Data interpretation	Difficult	Some ML algorithms are easy to interpret, whereas some are hardly possible

Jelvix jelvix.com

Machine learning is a subfield of artificial intelligence, which enables machines to learn from past data or experiences without being explicitly programmed.

Accordingly: in a way that is suitable or right for the situation

Concerned: involved or worried

Where is AI used? Examples

Chatbots for customer support

Recommendations from Amazon, YouTube, and Netflix

Self-driving vehicles

Robotic vacuum cleaners

Manufacturing robots

Smart home devices

Siri, Alexa, Cortana, Google Assistant and Watson

Virtual travel booking agents

Social media monitors

Automated healthcare management apps and systems

Search engines

Natural Language Processing (NLP) tools (e.g., GPT-3)

Online financial investing

Why is AI booming now?

Hardware

Data

Algorithm

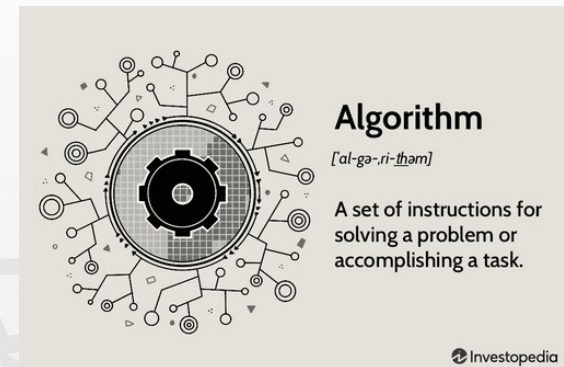
For instance, with an NVIDIA TITAN X, it takes two days to train a model called ImageNet against weeks for a traditional CPU.



Data powers artificial intelligence. Without data, nothing can be done. The latest Technologies have pushed the boundaries of data storage, and it is easier than ever to store a high amount of data in a data center.

Artificial intelligence combined with data is the new gold

Hardware is more powerful than ever, data is easily accessible, but one thing that makes the neural network more reliable is the development of more accurate algorithms.



Accordingly: in a way that is suitable or right for the situation

Concerned: involved or worried

Summary

AI is the science of training machines to imitate or reproduce human tasks.

A scientist can use different methods to train a machine. At the beginning of the AI's ages, programmers wrote hard-coded programs, typing every logical possibility the machine could face and how to respond.

When a system grows complex, it becomes difficult to manage the rules. To overcome this issue, the machine can use data to learn how to take care of all the situations from a given environment.

The most important feature of having a powerful AI is that it has enough data with considerable heterogeneity. For example, a machine can learn different languages as long as it has enough words to learn from.

AI is the new cutting-edge technology. Ventures capitalists invest billions of dollars in startups or AI projects, and McKinsey estimates AI can boost every industry by at least a double-digit growth rate.

General AI, Rule-based AI, Decision tree AI, Super AI are types of artificial intelligence.

Thanks



[Optional]

To learn more about Machine Learning, Deep Learning, and Neural Networks, read these articles:

Models for Machine Learning

Applications of Deep Learning

A Neural Networks deep dive

Hands-on Lab - Gesture Detection

Hands-on Lab - Gesture Detection

What Is AI or Artificial Intelligence?

[Ai_intro_1](#) [Ai_link_2](#)