

# How do we define AI?

## 3 applications of AI:

- **self-driving cars**

What would be improved?

road safety — reliability of the systems surpasses human level

efficiency of logistics chains — human supervise while machines take care of the driving

- **content recommendation**

What aspects it would applied for companies?

filter bubbles

echo-chambers

troll factories

New forms of propaganda

- **image and video processing**

create natural fake images or video

## Reasons for ambiguous public perception of AI

- **no officially agreed definition**

e.g. Cool things computers can't do?

- **the legacy of science fiction**

robots play the role of repressed sections of society

- **what seems easy is actually hard**

Scanning

Selecting and Picking up appropriate objects

Planning a trajectory for hands

- **what seems hard is actually easy**

Playing chess

Solving mathematical exercises

## A more explicit definition

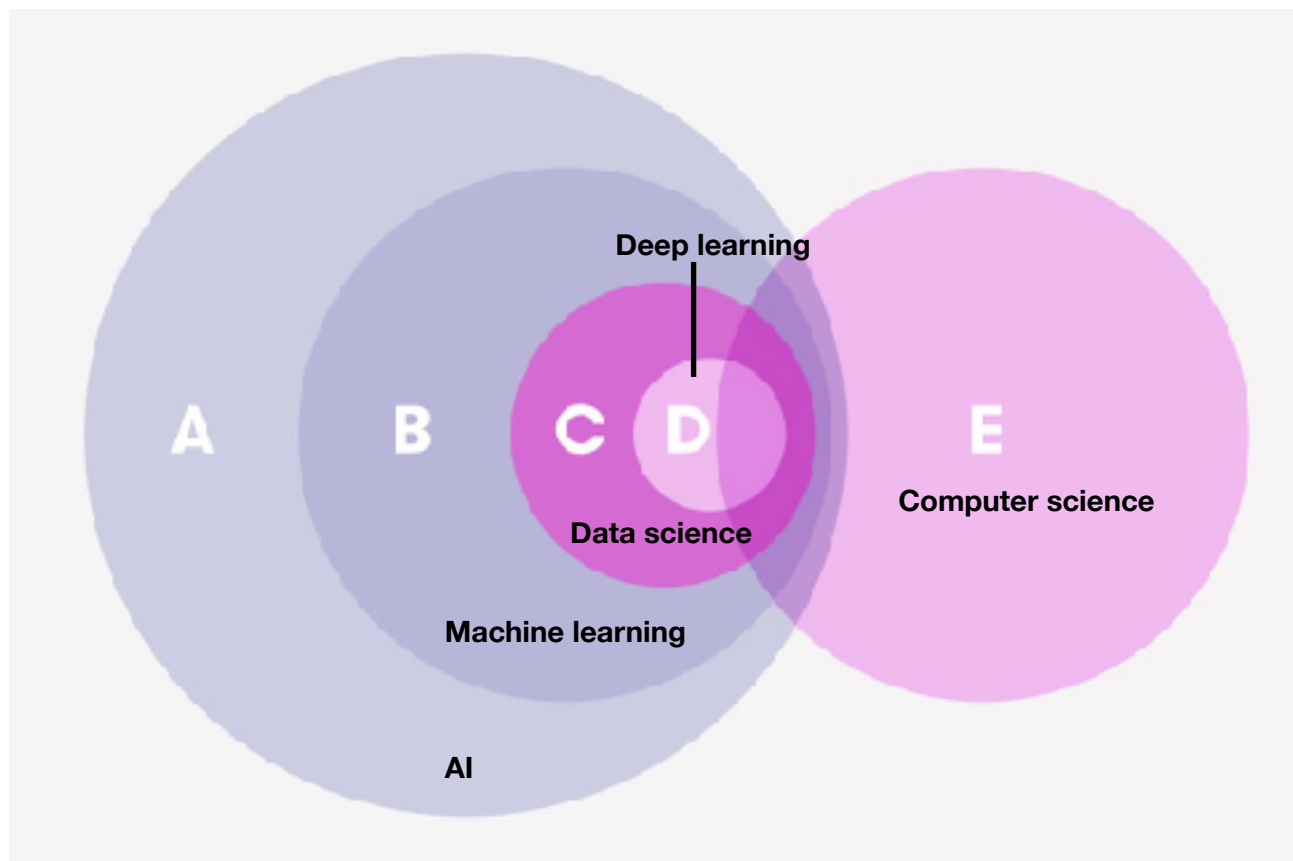
- **Autonomy**

- **Adaptivity**

- **characteristics: Incomparable intelligence; Alness; uncountable noun**

**Related fields:**  
**Machine learning**  
**Deep learning**  
**Data science**  
**Robotics**

**Relationship:**



## **Philosophy of AI**

- **does being human-like mean you are intelligent?**
- **Is Eugene a computer or a person?**
- **The Chinese room argument**
- **Is a self-driving car intelligent?**

# AI problem solving

## Search and games

- Search in practice: getting from A to B
- Toy problem: chicken crossing
- Playing tic tac toe - Game trees

# Real world AI

## Odds and probability

- probability - AI methods are able to deal with uncertainty

## The Bayes rule

- **Explanation**

It can be used to weigh conflicting pieces of evidence in various fields.

- **Application**

Naive Bayes classification - spam filters

Whether a message is spam or whether it is a legitimate message

# Machine learning

Types of machine learning

- supervised learning

We are given an input and the task is to predict the correct output or label

- a photograph of a traffic sign
- Human teaching machines

- unsupervised learning

There are no labels or correct outputs and the task is to discover the structure of the data.

- data visualization
- Learning without a teacher

- reinforcement learning

Feedback or outcome is available with some delay.

- a self-driving car
- Some games

- the categories are somewhat overlapping and fuzzying

- semisupervised learning

Partly supervised and partly unsupervised

Caveat

- training data
- Test data

The nearest neighbor classifier

- defining 'nearest'
- using nearest neighbors to predict user behavior
- recommendation system

Regression

- linear regression
- Learning
- Visualizing
- Predicting

Click rates in online products

Retail demand for products

Box-office revenue of Hollywood movies

Software cost

Insurance cost

Crime rates

- Limits

- the hardness of the task
- The machine learning method
- The amount of training data
- The quality of the data

# Netural network

- neural network basics

- Definition

A “real” biological neural network

An artificial neural network simulated in a computer

- Development of artificial neural networks

- what is special about neural networks

the system consists of a large number of neurons, each of which can process information on its own

the neurons process vast amounts of information simultaneously

there is no need to retrieve data from the memory for processing

- how neural networks are built

Activations and outputs

Perceptron: the mother of all ANNs

Putting neurons together: networks

- advanced neural network techniques

- CNNs

- GANs

# Implications

- the societal implications of AI
  - algorithmic bias
    - Online advertising
    - Social networks
  - Seeing is believing
  - Changing notions of privacy
    - Using data analysis to identify individuals
    - Other methods of identification
  - Changing work