



ELTE

FACULTY OF
INFORMATICS

INTRODUCTION

Machine Learning Course
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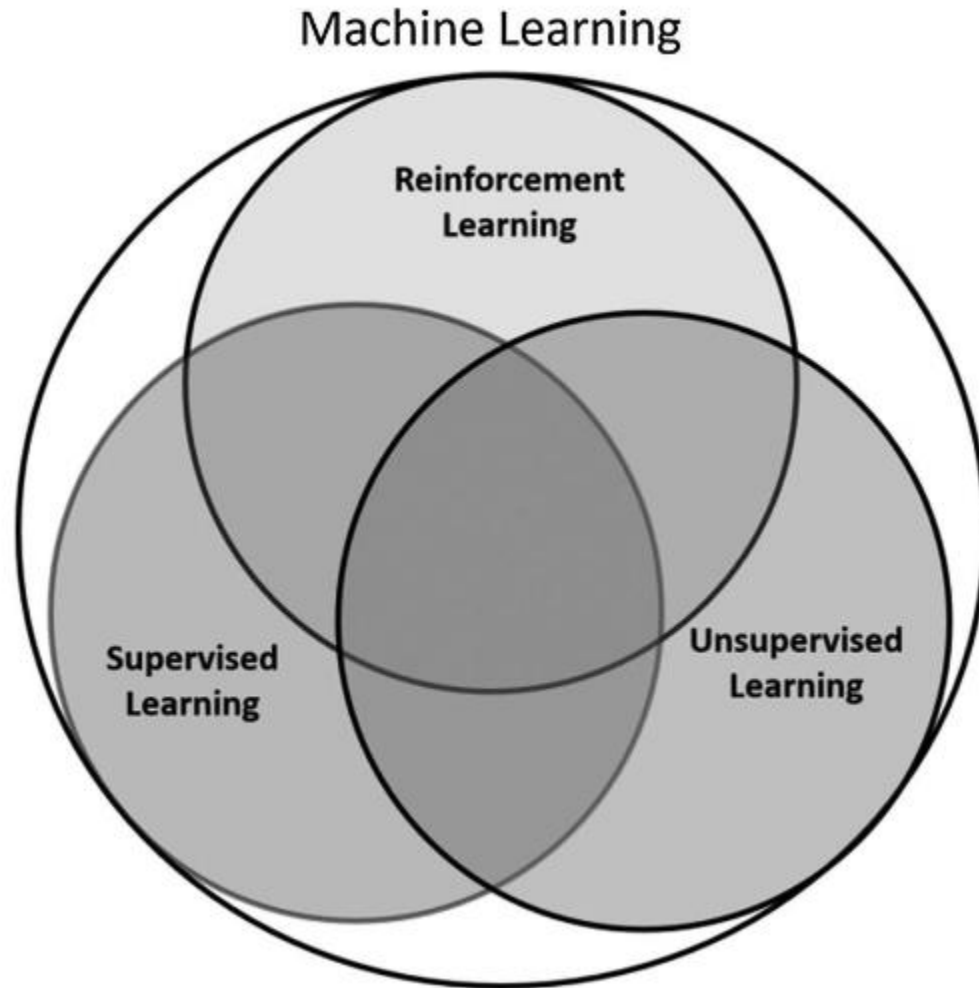
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Machine Learning

„The field of study that gives computers the ability to learn without being explicitly programmed.”

Arthur Samuel

Big picture



Artificial Intelligence

Any technique that enables computers to mimic human intelligence.

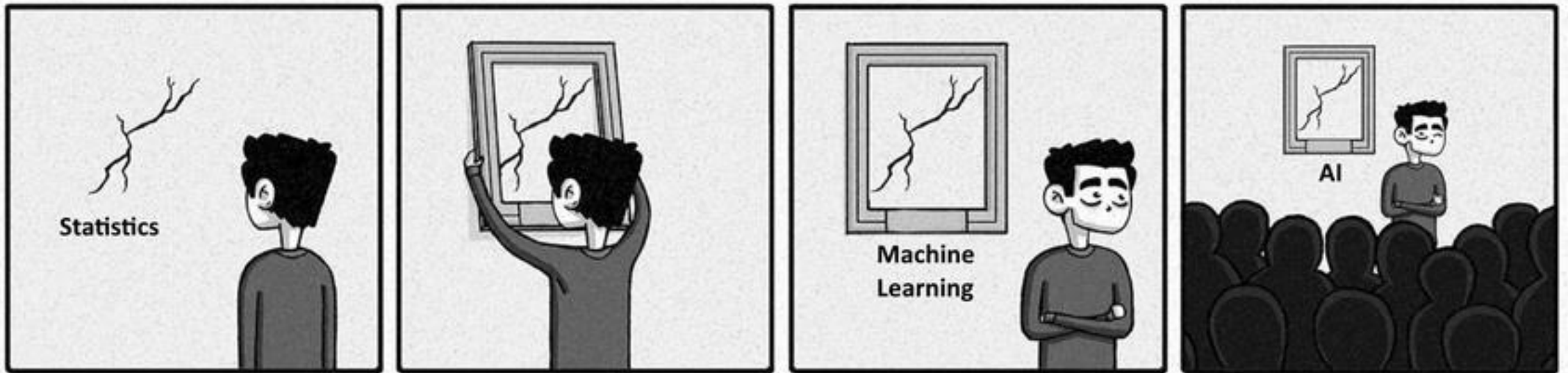
Machine Learning

A subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience.

Deep Learning

The subset of machine learning composed of algorithms that permit software to train itself to perform tasks by exposing multilayered neural networks to vast amount of data.

Oversimplified view



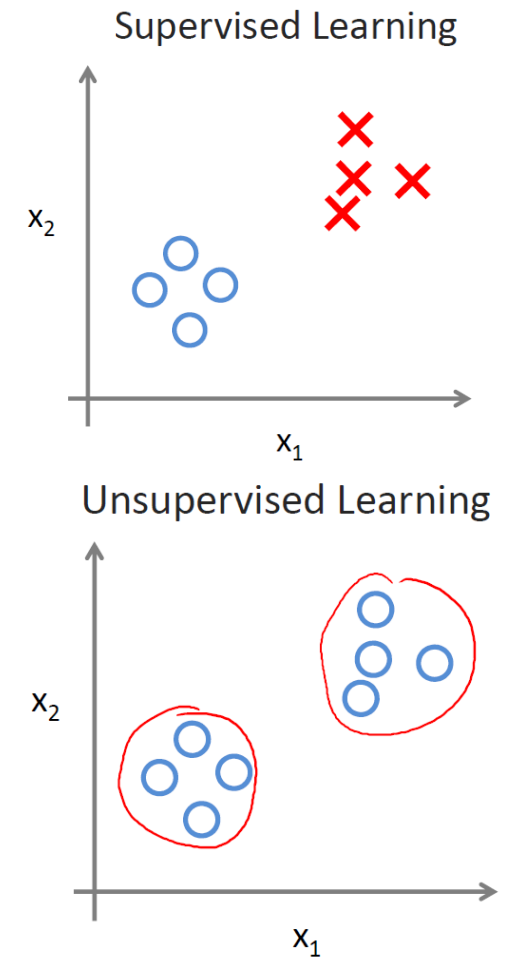
Motivation behind ML

- Database mining
- Self programming applications
- Understanding human learning
- **Optimization**



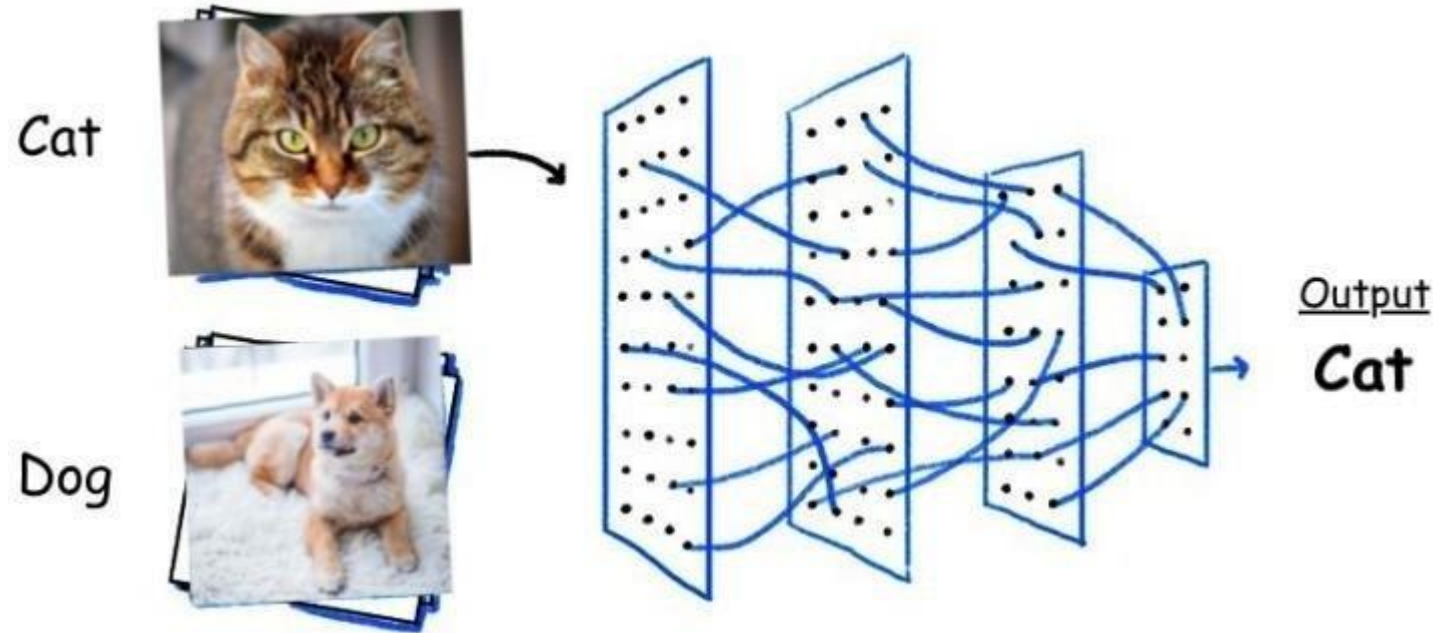
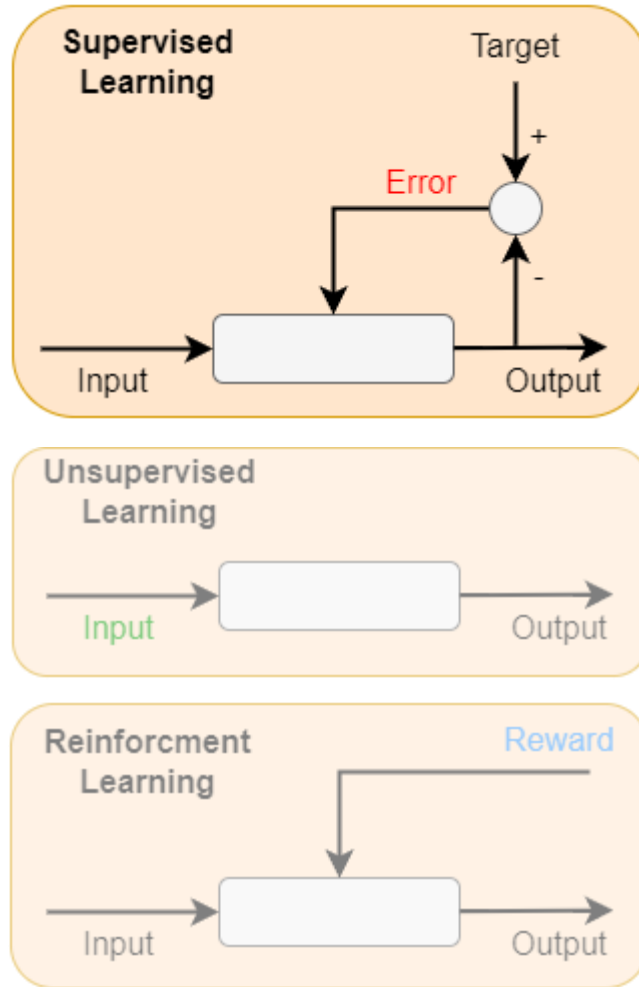
Different approaches

- Supervised learning („right answer” is given)
 - Regression (predict continuous valued output)
 - Classification (discrete valued output, 0 or 1)
- Unsupervised learning
 - Dimensionality reduction
 - Clustering
- Reinforcement learning



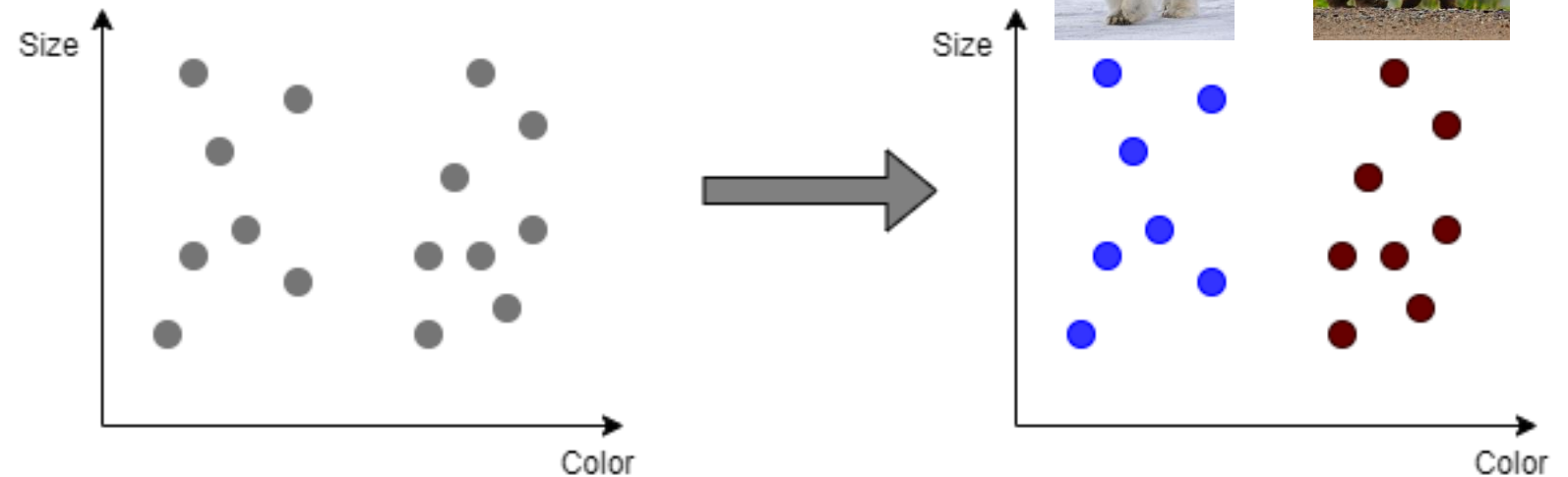
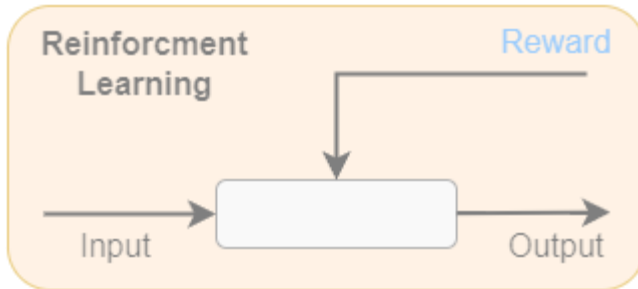
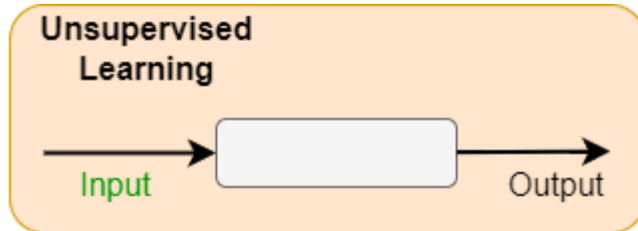
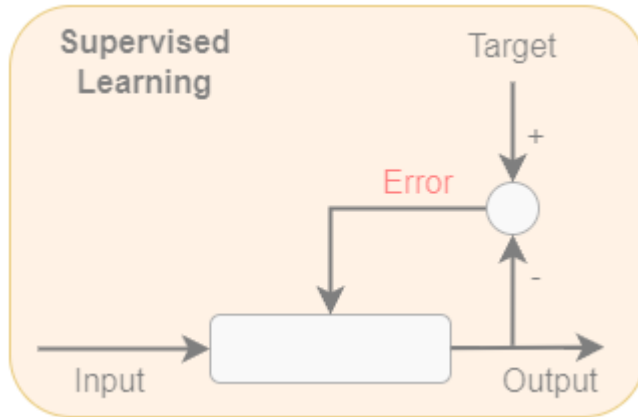
Supervised Learning

- System is presented with the labeled data
- The objective is to **generalize** the knowledge so that new unlabeled data can be labeled

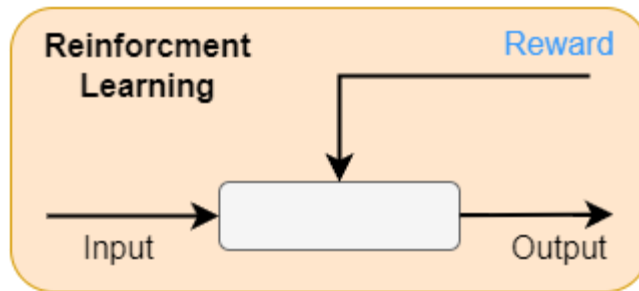
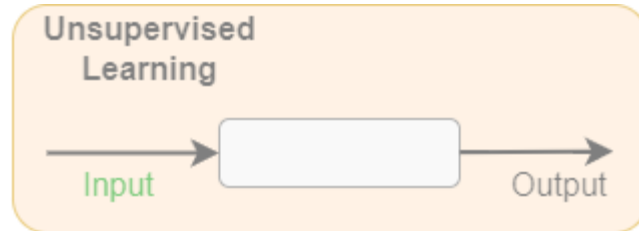
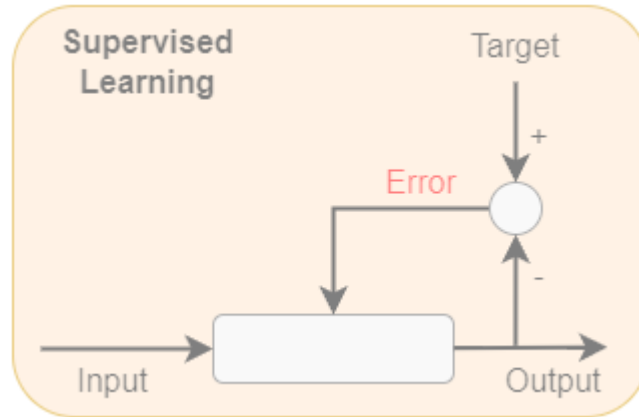


Unsupervised Learning

- No labels, only has the inputs
- The system uses this data to **learn the hidden structure** of the data so that it can cluster/categorize the data into some broad categories.
- Often used for feature extraction



Reinforcement Learning



- The agent does not have prior knowledge of the system. It has to **learn from experience**.
- It gathers feedback and uses that feedback to plan/learn actions to **maximize a specific objective**.
- As it does not have enough information about the environment initially, it must **explore** to gather insights.
- Once it gathers “enough” knowledge, it needs to **exploit** that **knowledge** to start **adjusting** its **behaviour** to **maximize the objective** it is chasing.





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Thank you for your attention!