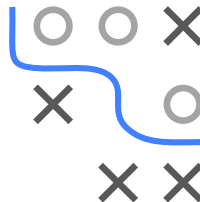
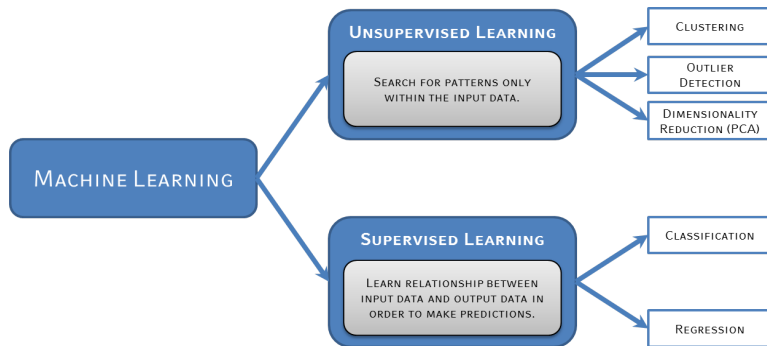


Introduction to Machine Learning

Introduction - Ontology of ML Tasks



MACHINE LEARNING TASKS

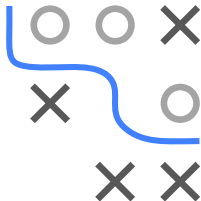


In this course, we will deal with **supervised learning** for regression and classification only: predicting labels y based on features x , using patterns that we learned from labeled training data.

ADDITIONAL LEARNING TASKS

Unsupervised learning

- Data without labels y
- Search for patterns within the inputs x
- *unsupervised* as there is no external criterion to optimize or “true” output
 - Dimensionality reduction (PCA, Autoencoders ...) : Compress information in \mathcal{X}
 - Clustering: Grouping similar observations, separating dissimilar observations
 - Outlier detection, Anomaly detection
 - Association rules



ADDITIONAL LEARNING TASKS / 2

Semi-Supervised learning

- Large amount of labeled data necessary to train reliable model
- Creating labeled datasets often very expensive
- Learn from labeled (expensive) **and** unlabeled (cheap) data
- Unlabeled data in conjunction with a small amount of labeled data improves learning accuracy



Reinforcement learning

- Select actions in subsequent states within a certain environment to maximize lagged future reward
- Example: train neural net to play mario kart (environment)
 - Accelerate/ steer/ break (actions) at each time point (states) during playing
 - Reward: ranking after finish, should be maximized