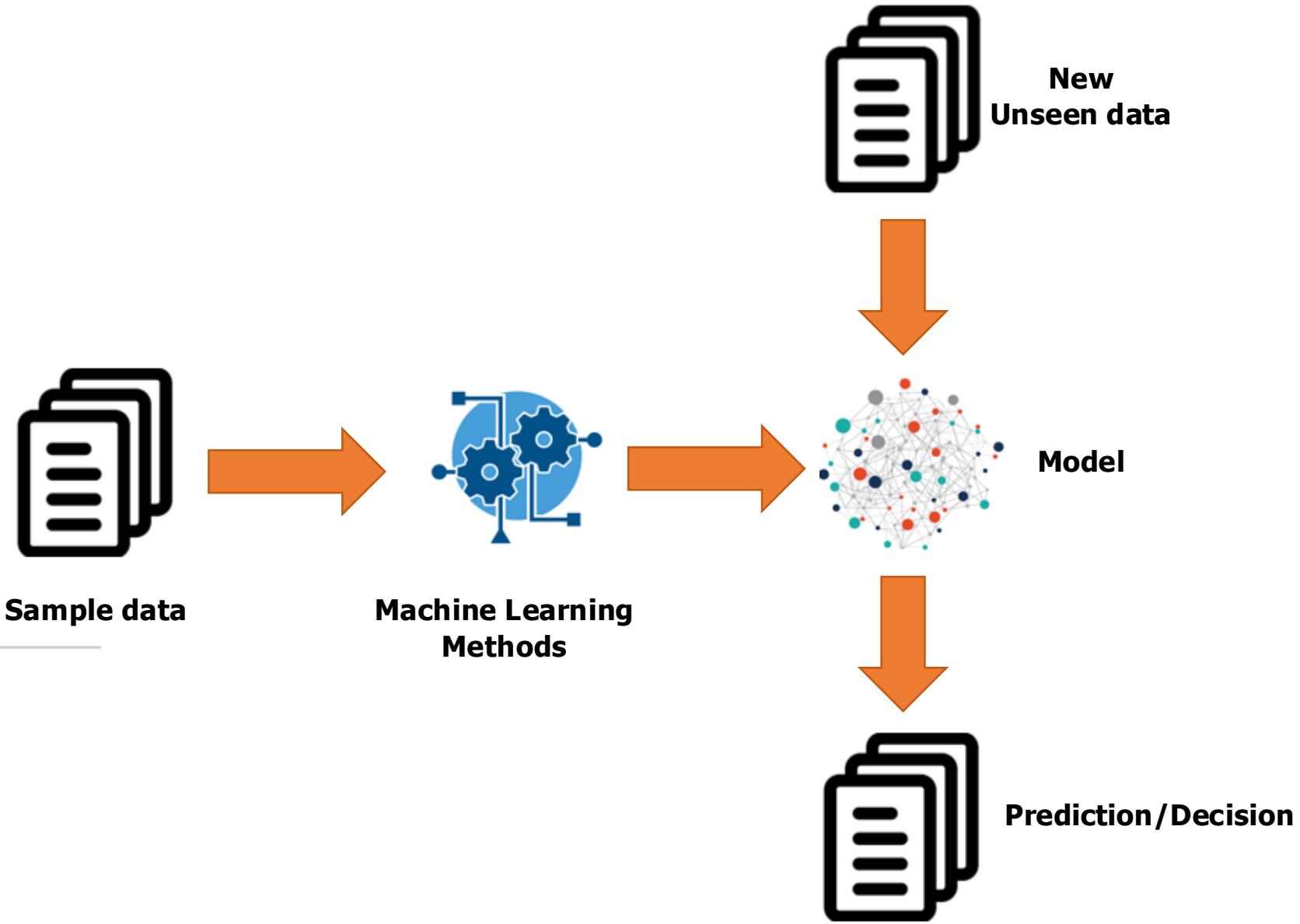
ML - 1

Machine Learning

- What is Machine Learning
- Learning Types
- Data Preparation
- Cross Validation
- Overfitting

Prof. Umut ORHAN

What is Machine Learning ?

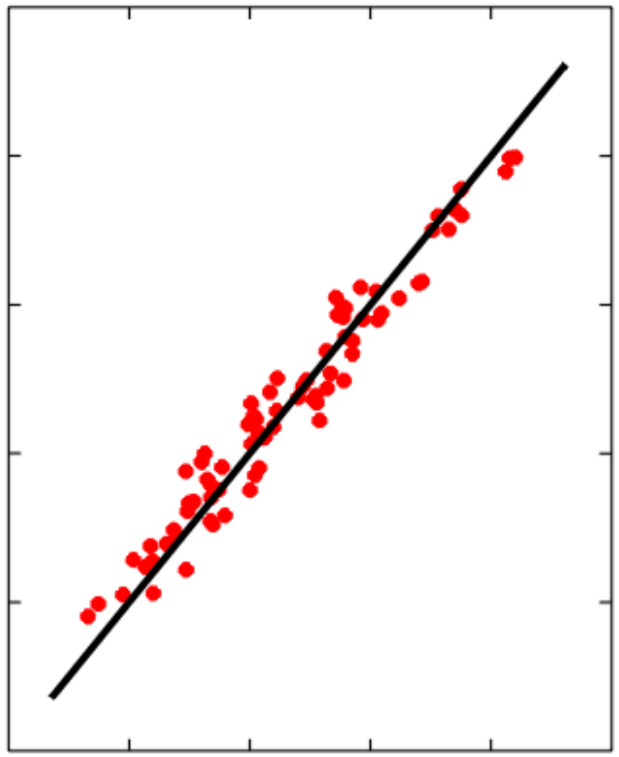


Learning Types

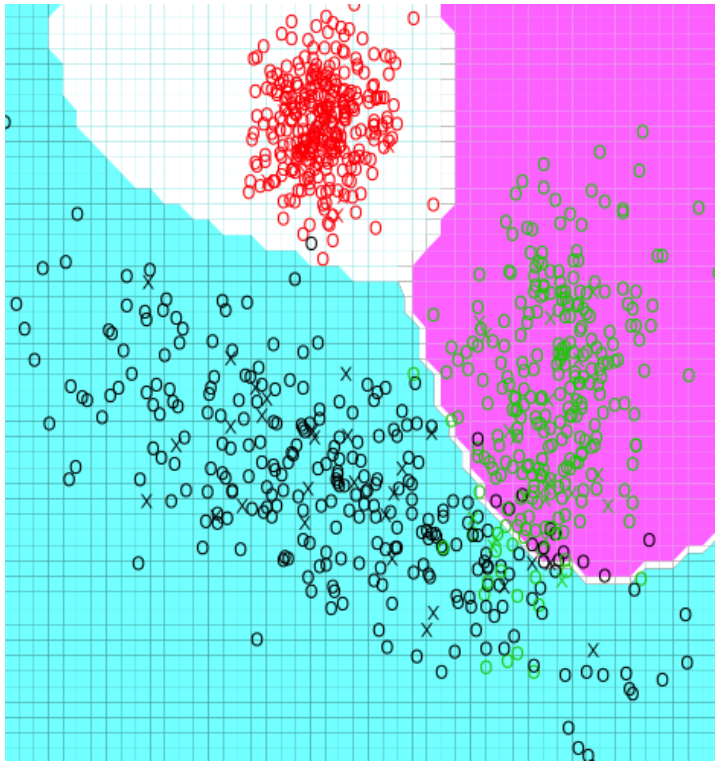
- **Supervised Learning**
  - Regression
  - Classification
- **Unsupervised Learning**
  - Clustering
  - Dimensionality Reduction
- **Reinforcement Learning**
  - Reward and Penalty

Supervised Learning

Regression



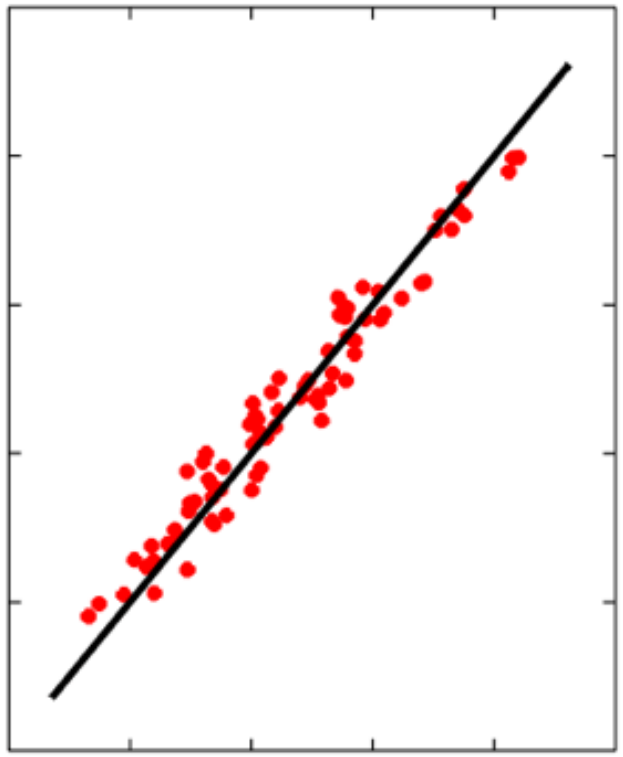
Classification



Supervised Learning

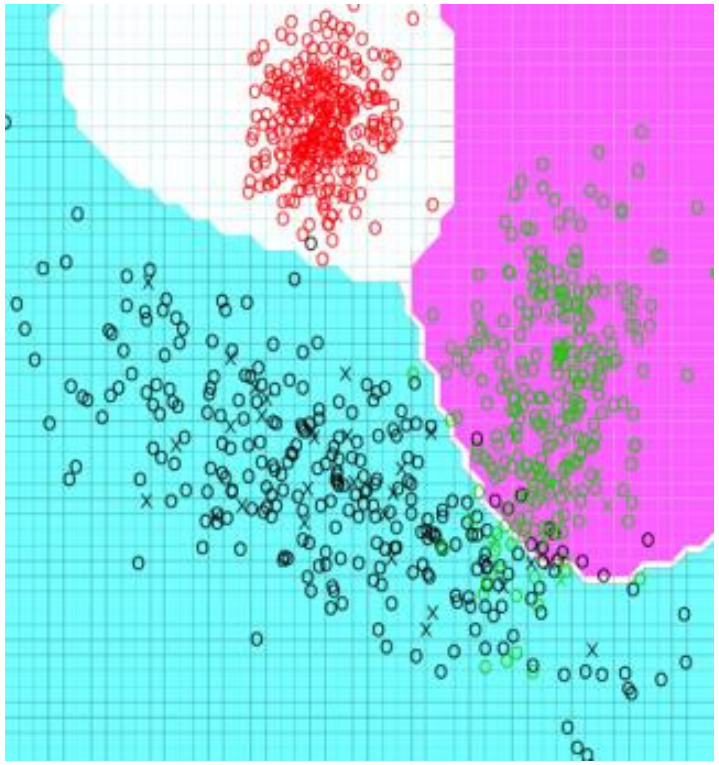
Regression

X	D
3	9
5	15
8	24
10	30
19	57
24	72
27	81
31	93



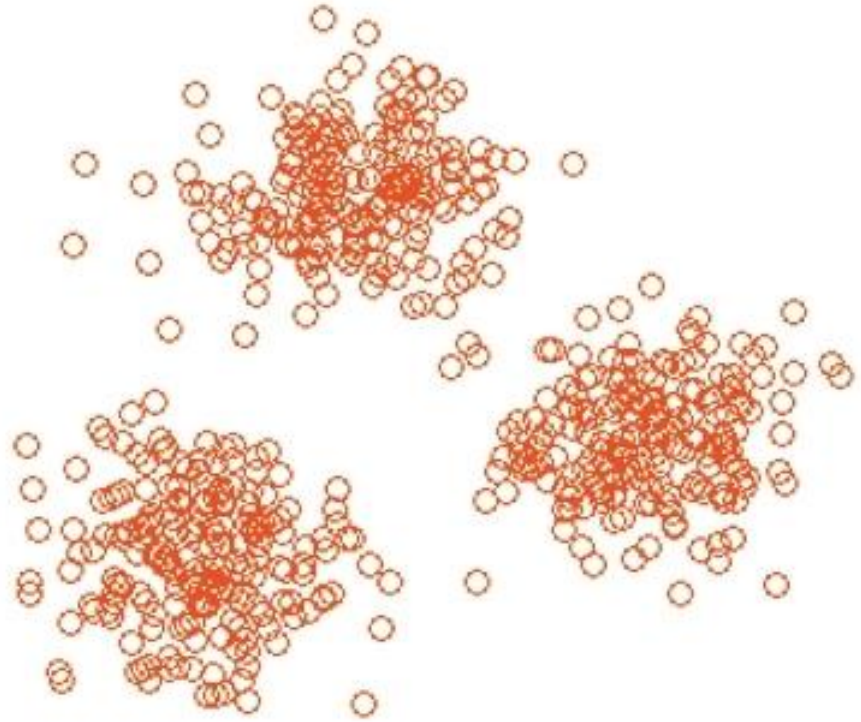
Classification

X_1	X_2	D
10	6	A
12	5	A
20	9	B
24	11	B
30	19	B
13	15	C
16	17	C
18	19	C

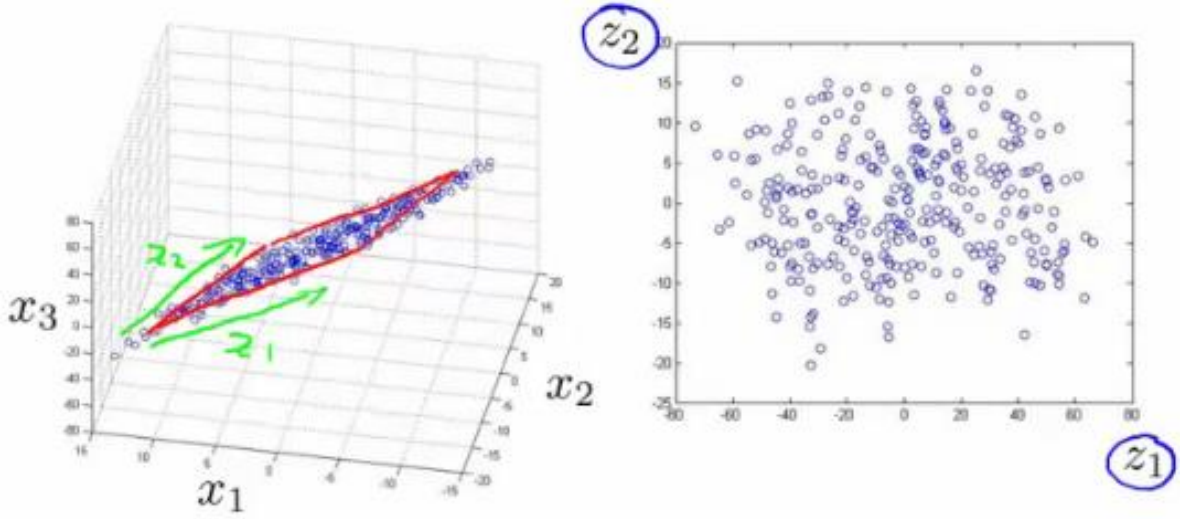


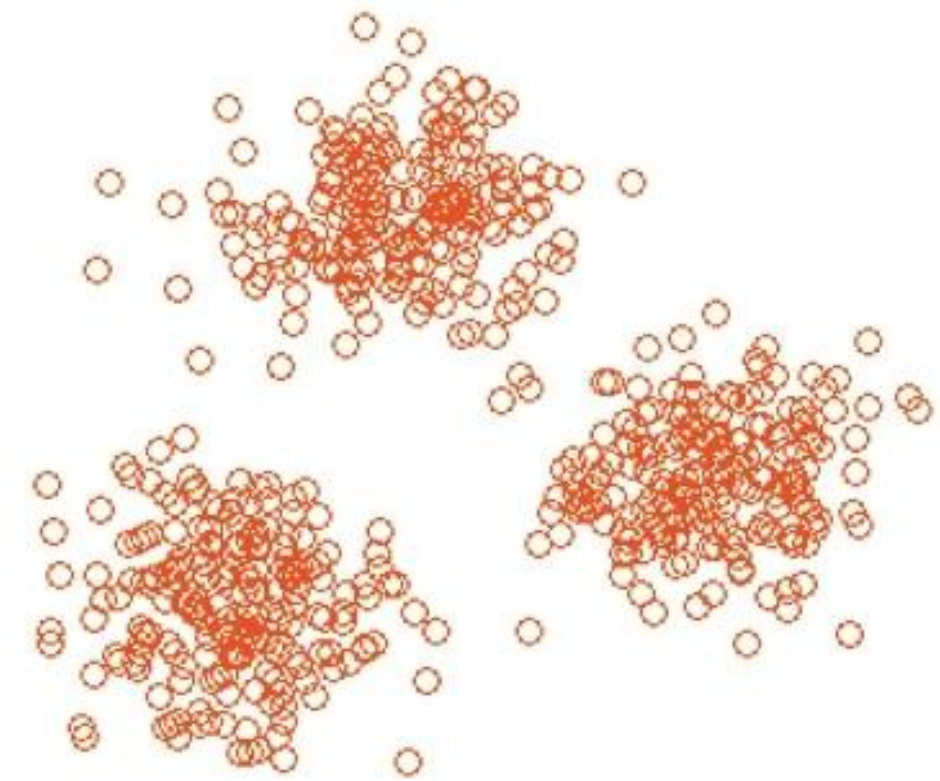
Unsupervised Learning

Clustering



Dimensionality Reduction



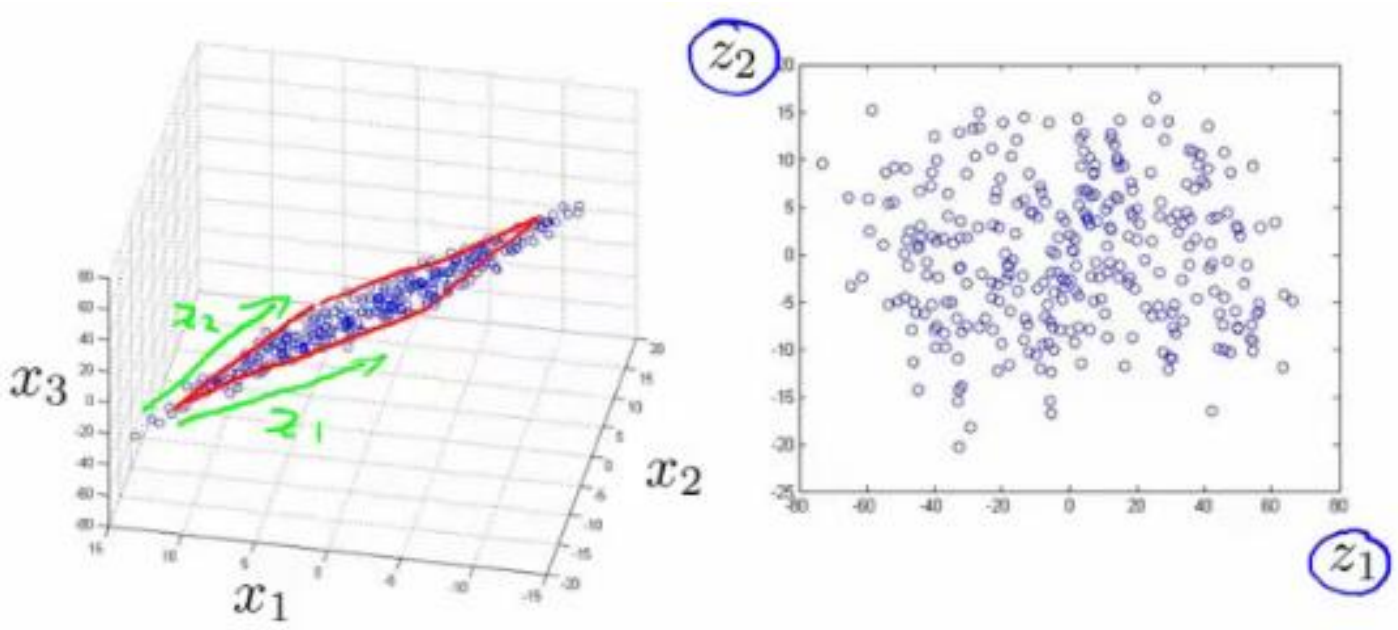


Unsupervised Learning

Clustering dealing with unlabeled data is the process of organizing similar objects into the same groups and dissimilar objects into different groups.

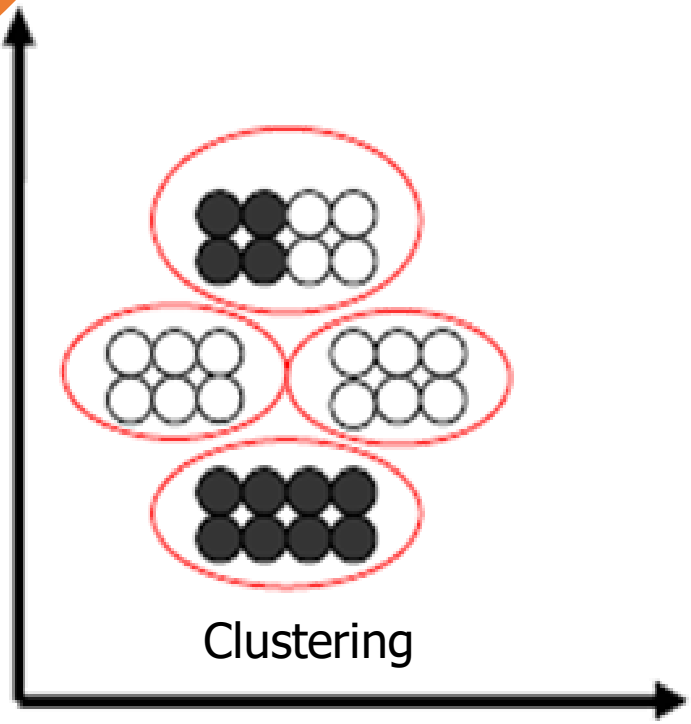
Unsupervised Learning

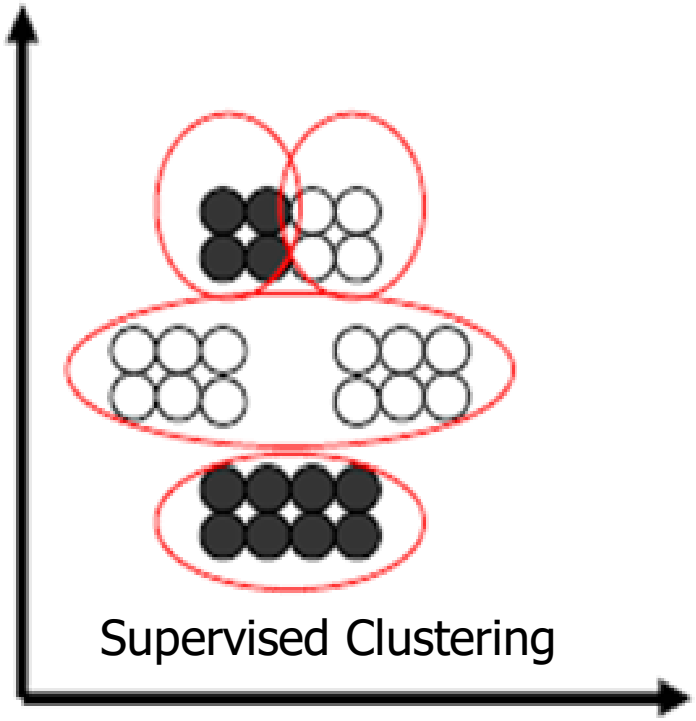
Dimensionality reduction is a process used in machine learning and data analysis to reduce the number of input variables in a dataset.



Hybrid Methods

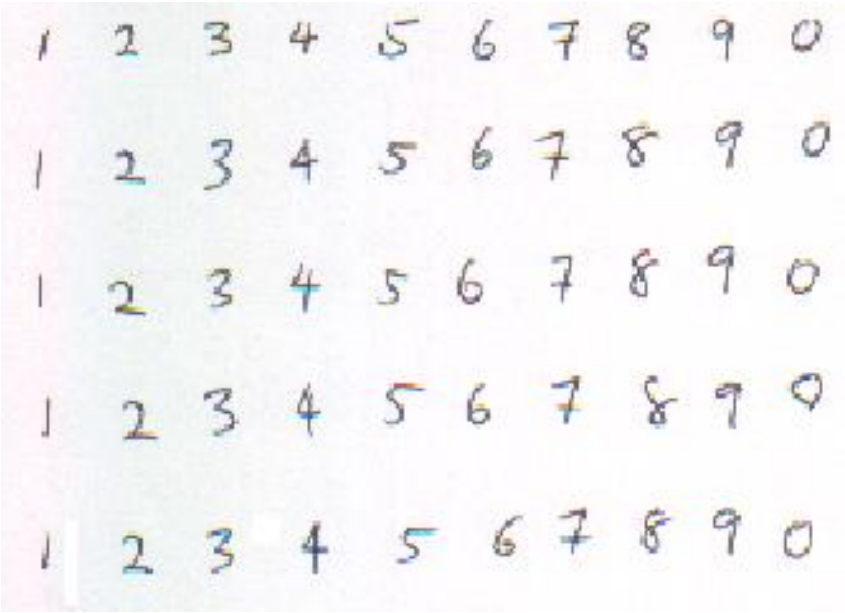
Supervised clustering is a hybrid approach that integrates elements of both supervised learning and traditional clustering.





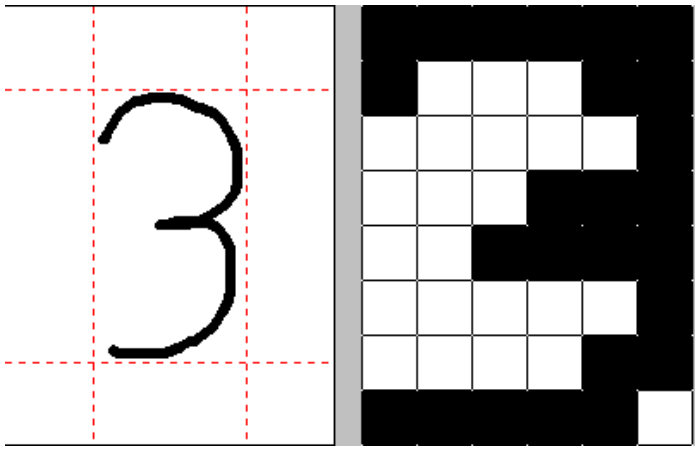
Reinforcement Learning

- Act by trial-and-error
- Interacting environment
- Feedback(Reward/Penalty)
- Improve decisions by maximizing rewards



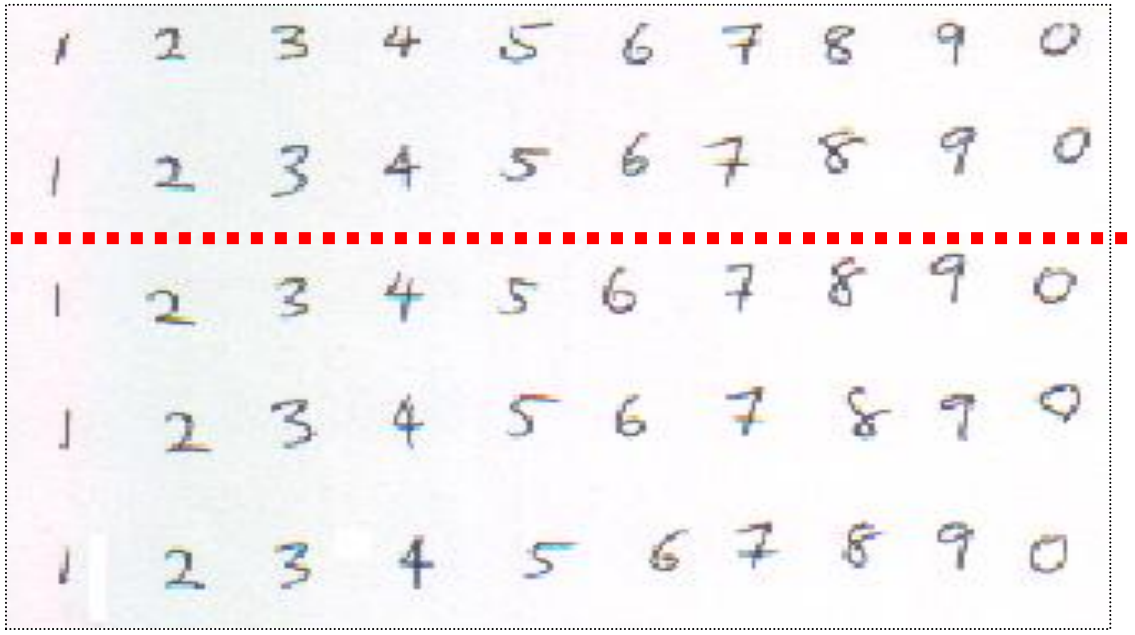
Data Preparation

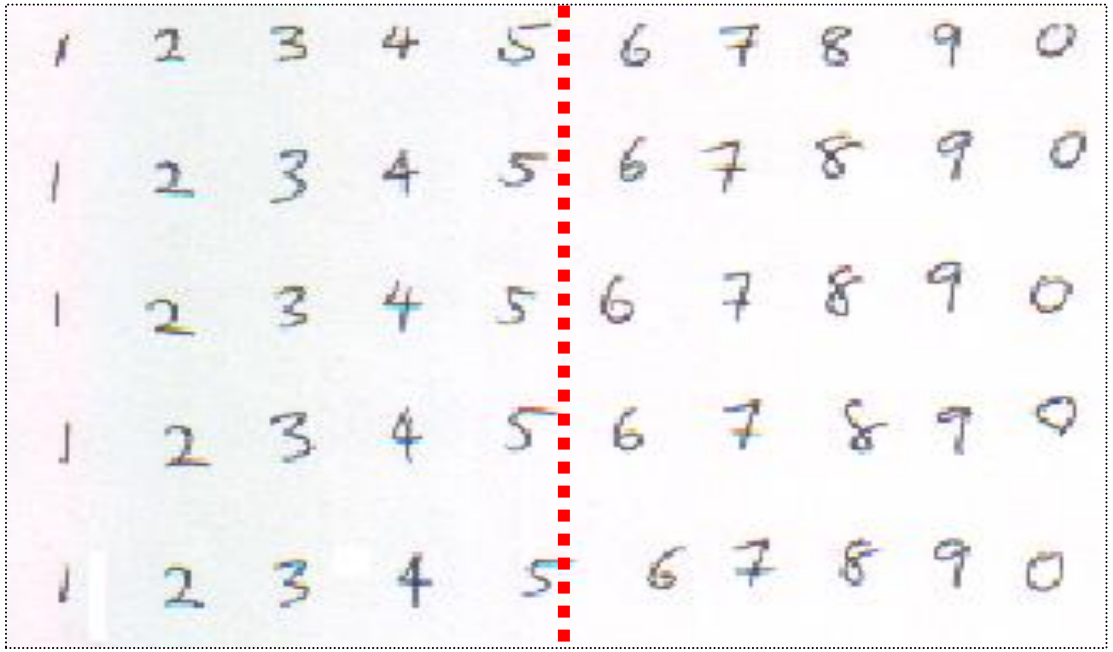
- Improve Data Quality
- Feature Selection and Extraction
- Data Scaling and Normalization



Data Preparation

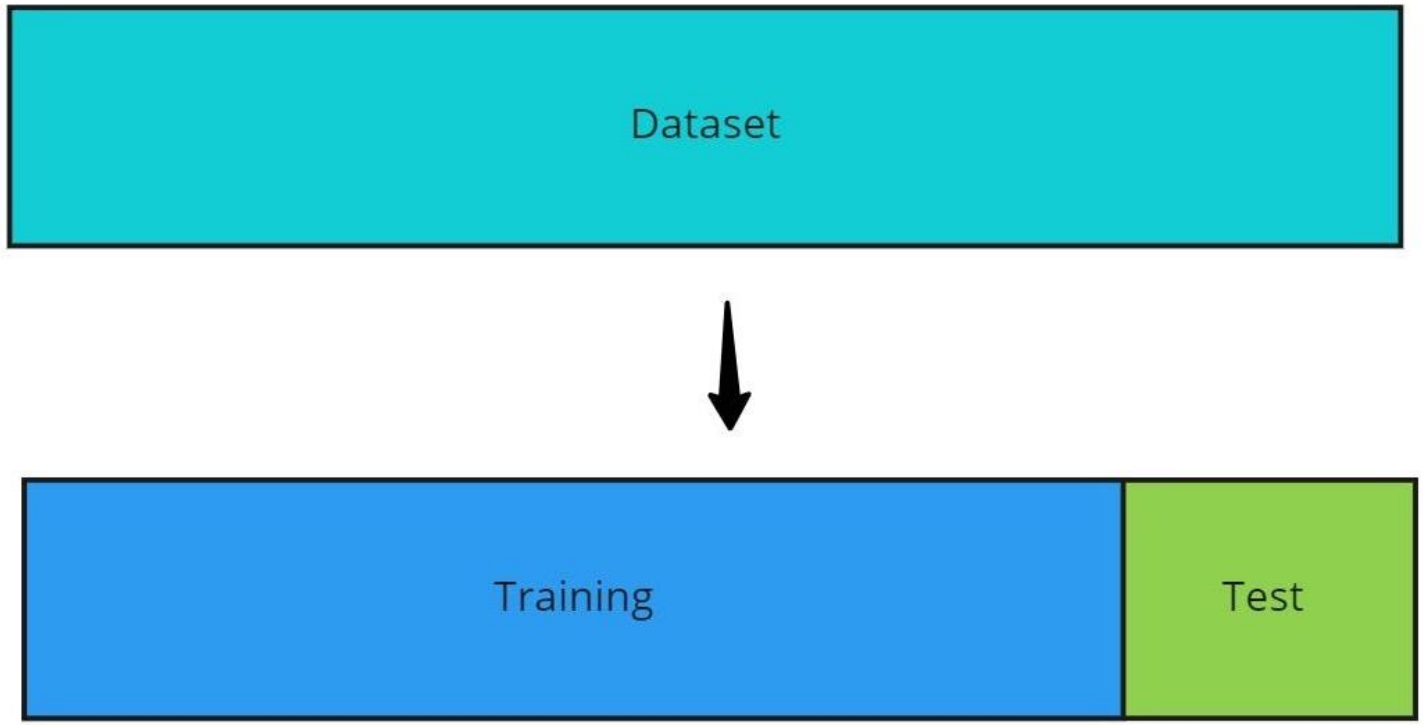
- Imbalanced datasets
- Data Augmentation
- Data splitting





Cross Validation

The system is trained using the training set, and its success is measured on the test set.

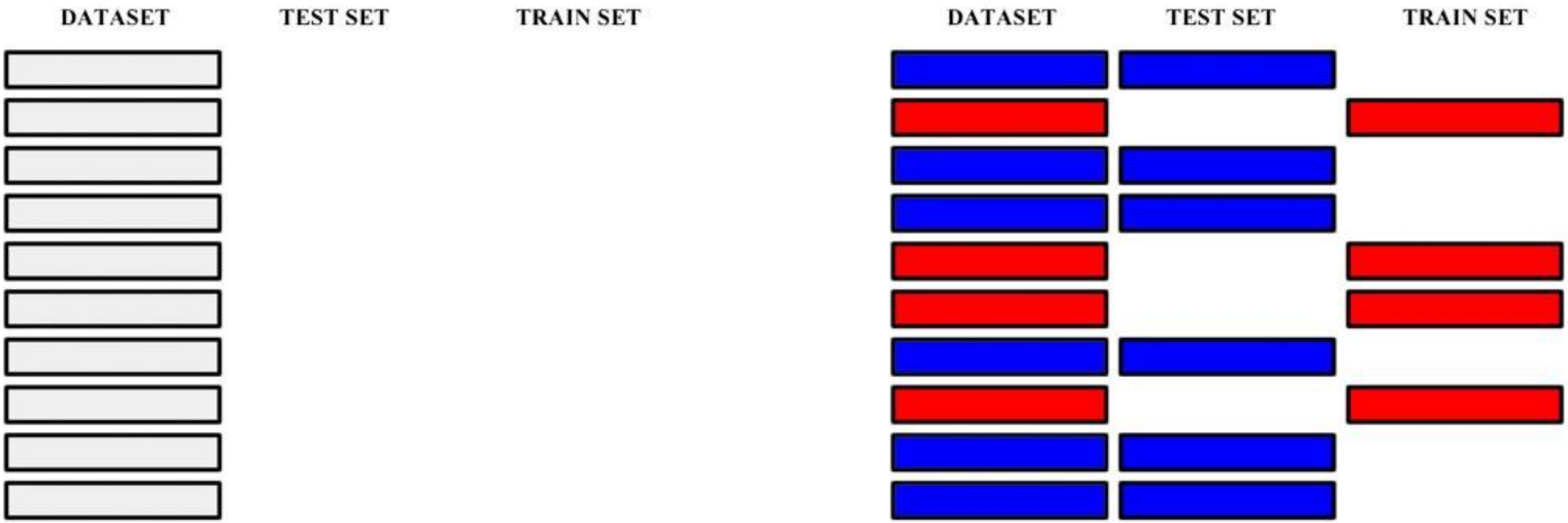


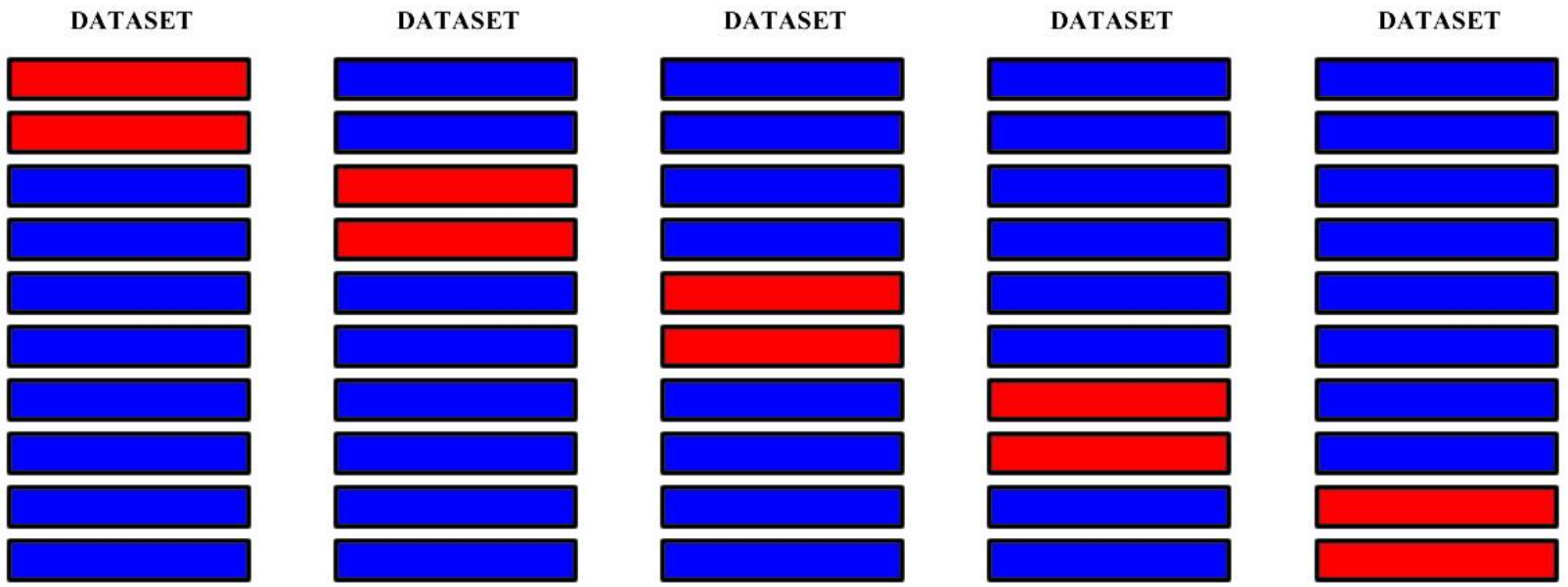
Cross Validation

Some methods of cross-validation are:

- Random sampling
- K-fold
- Leave one out

Random Sampling





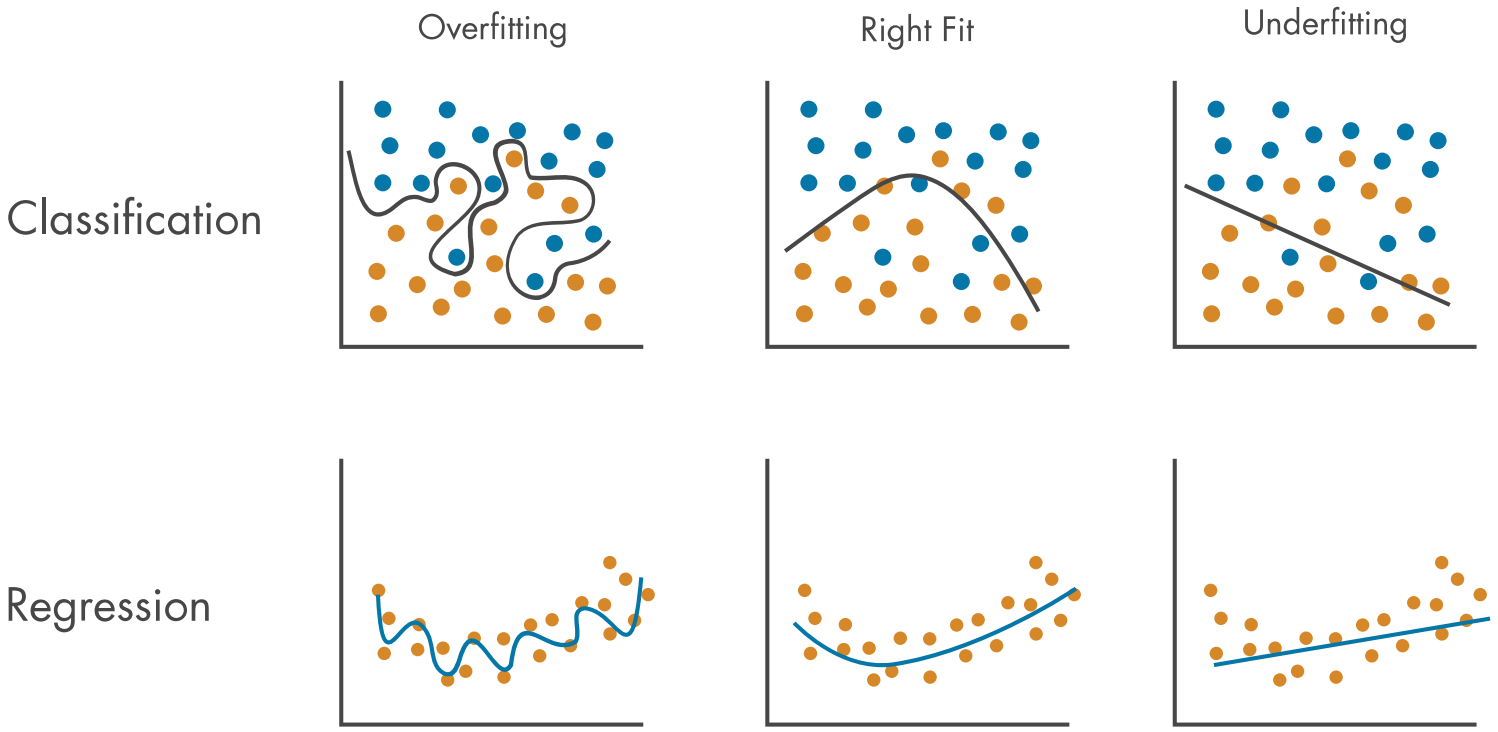
K-Fold

Red folds show test-set, Blue ones are train-set.

Leave One Out

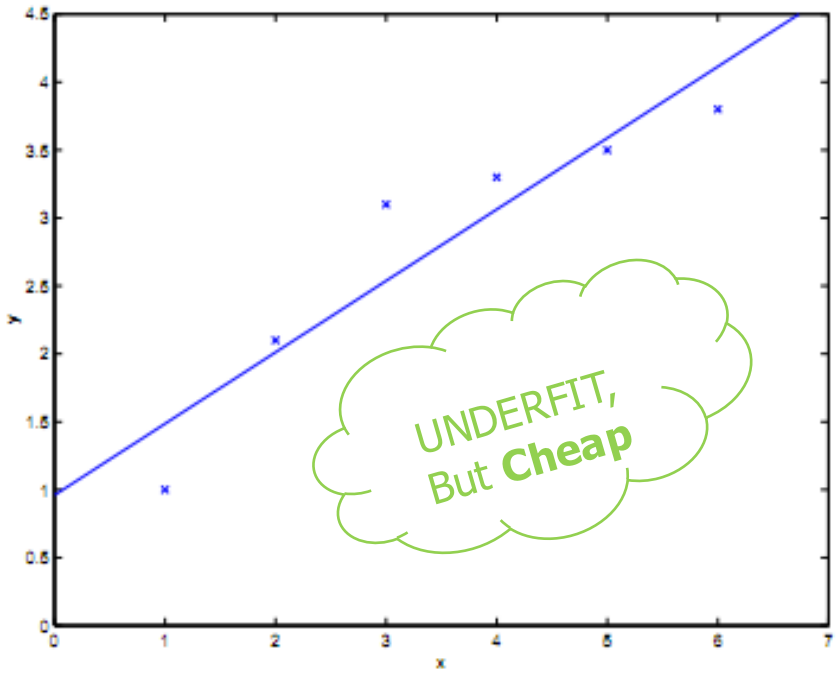
- It is a special version of K-fold (K = N).
- For a dataset with N samples, if we choose number of folds (K) as number of samples (N), then…
- K-fold runs as Leave One Out method.

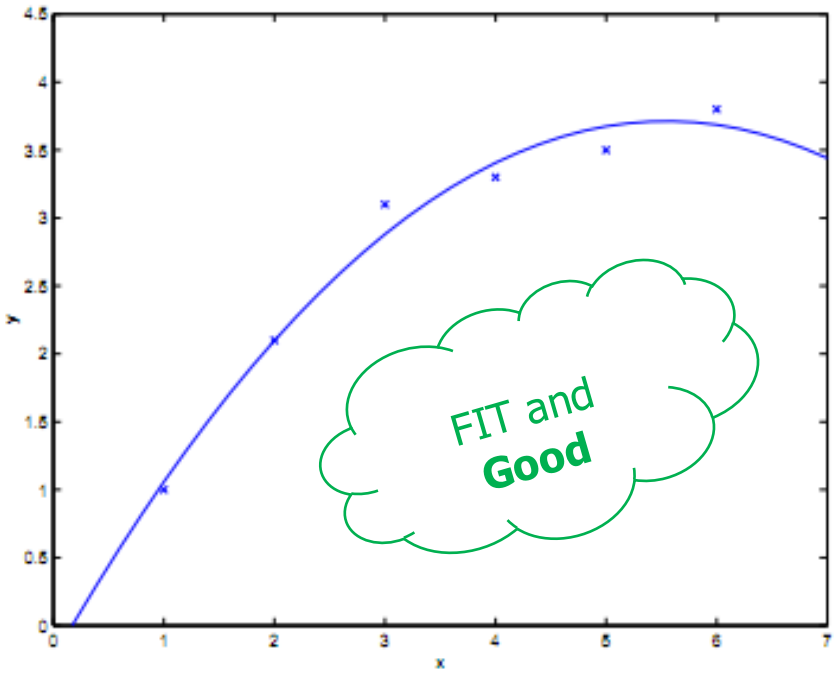
Overfitting

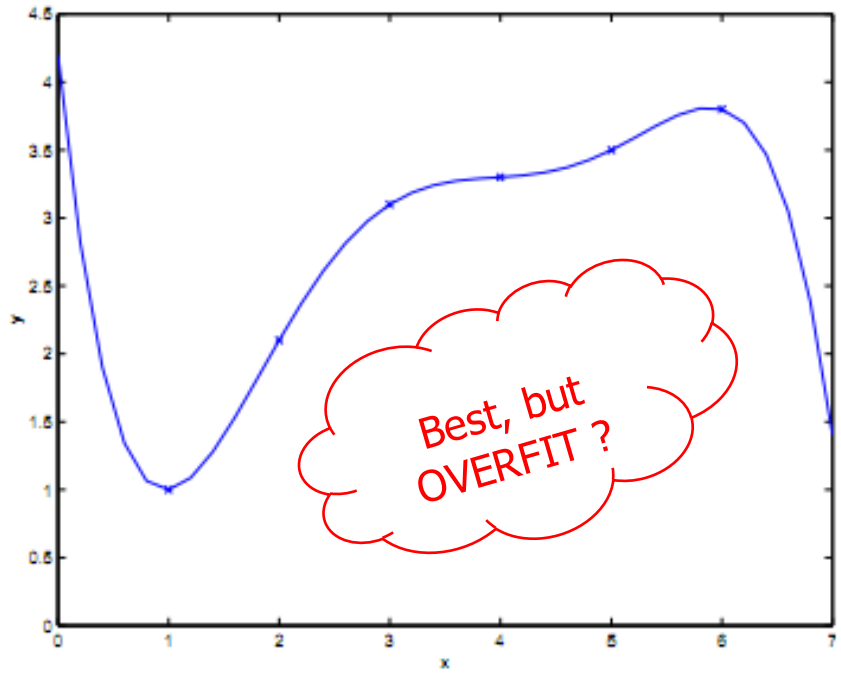


Which model?

Machine learning methods can be different to each other according to their approach to problem and therefore may have different success in different problems.







Machine Learning

1. week

Thanks for watching