UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

Trends in Computer Science

4COSC008C

Overview of Machine Learning. Describe and compare two different machine learning techniques.

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Tutorial Slot: 5th March, 09.00 – 09.30
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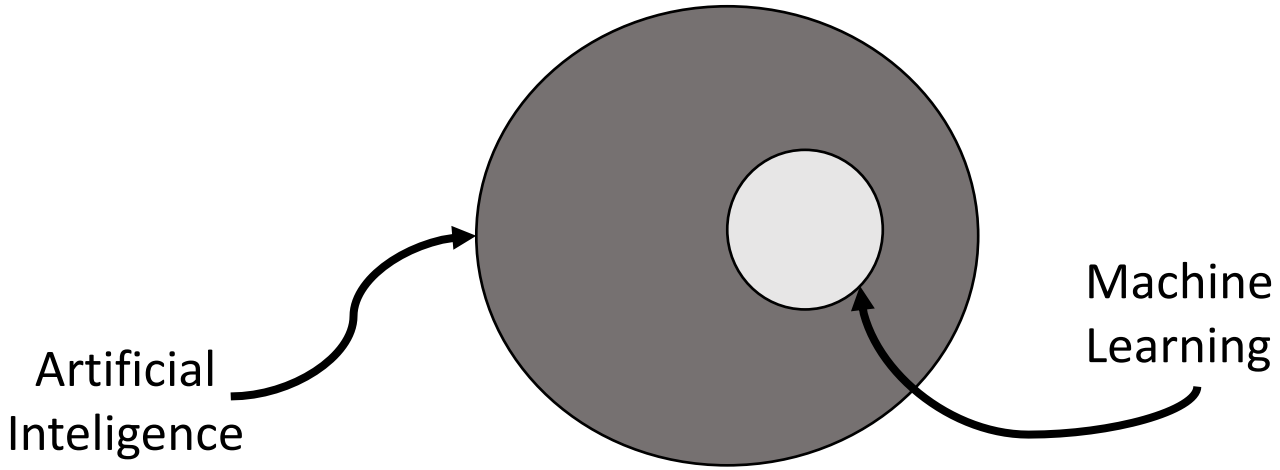
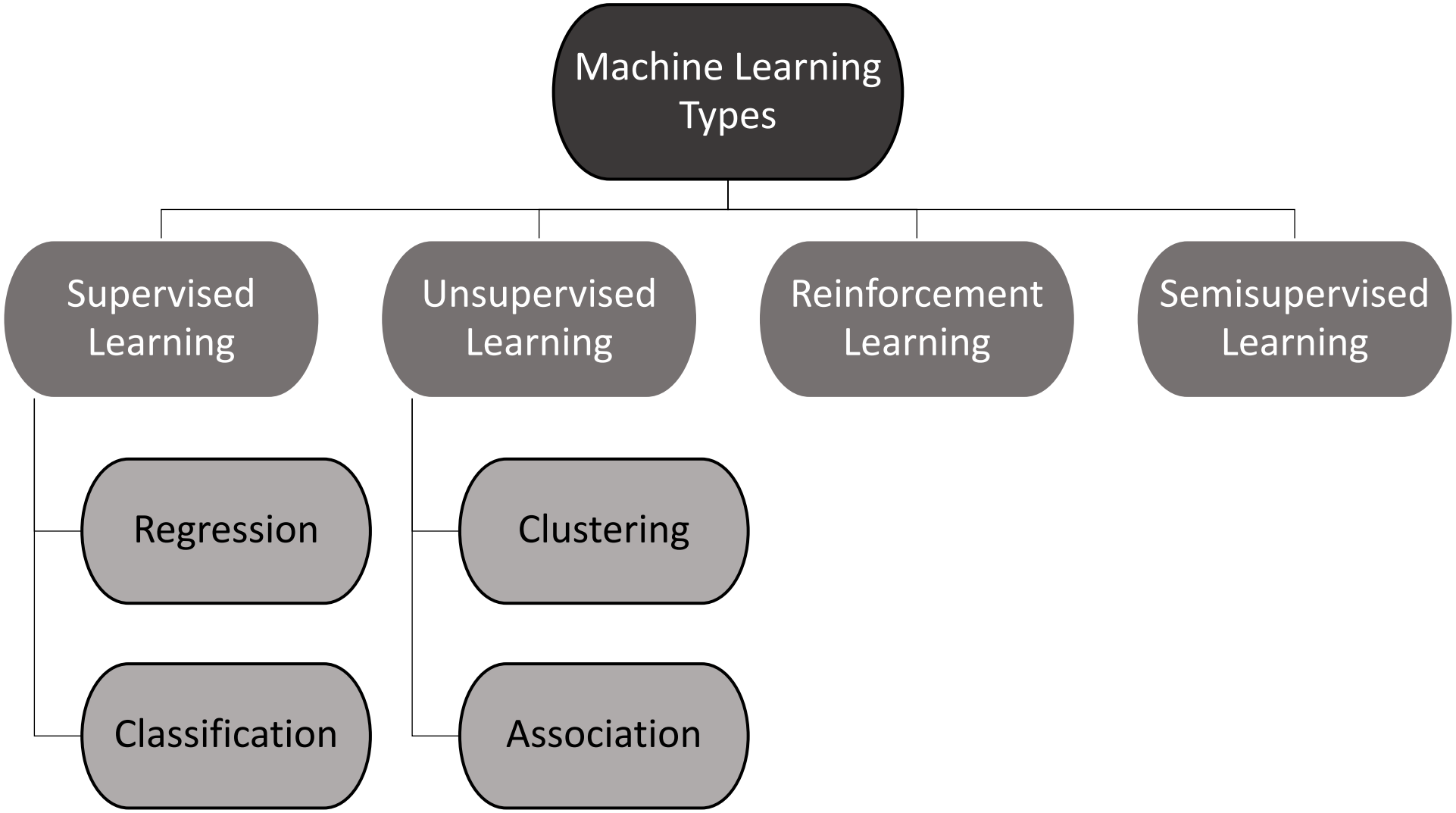
Overview of Machine Learning

- Machine Learning (ML) is the technique of giving machines the ability to learn from data and make decisions without direct programming.

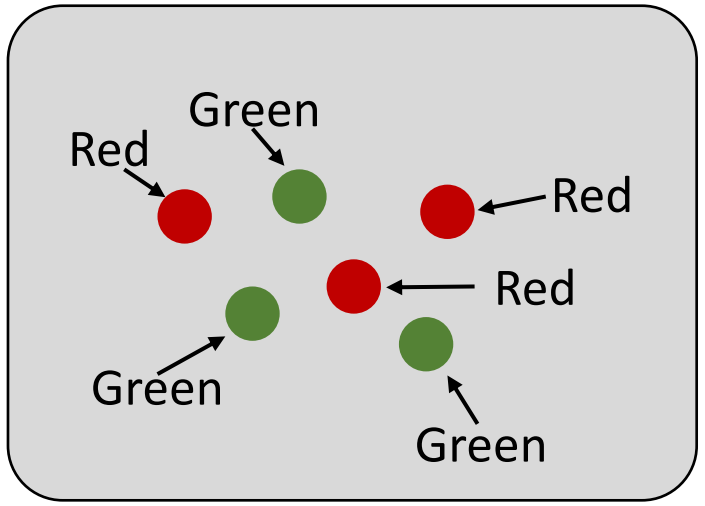
The machine learning procedure




Machine Learning Types
Supervised Learning
Unsupervised Learning
Reinforcement Learning
Semisupervised Learning
Regression
Classification
Clustering
Association

Supervised learning

- Labeled data
- Given input(x) and output(y) pairs
- Learn a function f(*x*) to predict *y* given *x*



X : ● / ●

Y : Green / Red

Types of Supervised learning,

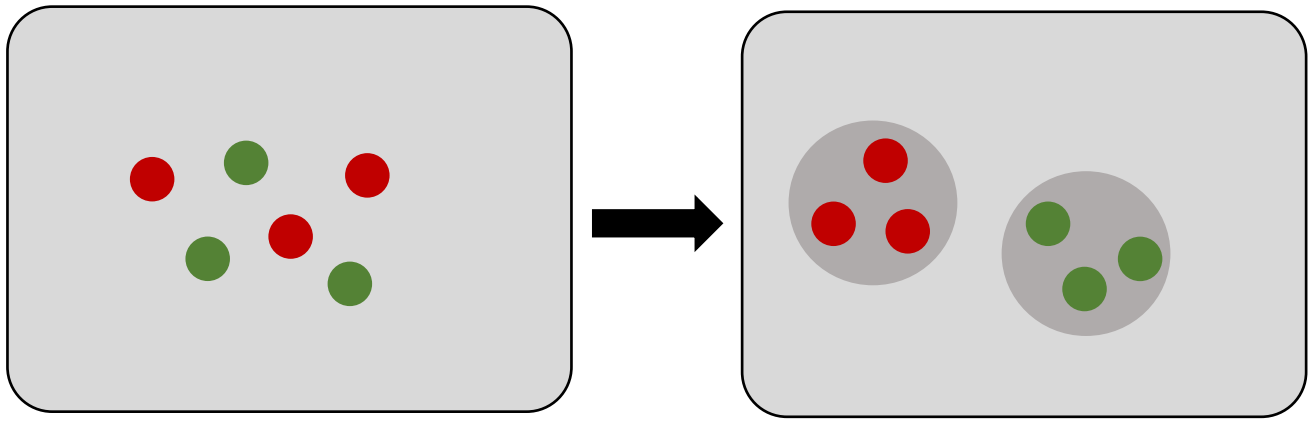
1. Classification: Sorting data by defined classes
2. Regression: Forecasting continuous values

Applications,

- Image and video classification
- Email and thread summarization
- Speech recognition on virtual assistant
- Handwriting recognition

Unsupervised learning

- Extracting patterns and relationships from unlabeled data without predefined outputs.
- Only input (x) data is provided.



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Clustering

Types of Unsupervised learning,

1. Clustering: Grouping similar objects
2. Assosiation: Identifyng relationships among given data

Applications,

- Social network analysis
- Identification of the speaker by analysing the voice data
- Market segmentation

Supervised Learning	Unsupervised Learning
Data with labels	Data without labels
The input (x) and output (y) data sets are included.	Only input data (x) is included.
Learns a mapping between input and output pair and enables prediction on unseen data.	Find hidden patterns and structures within the data.
More accurate	Less accurate
Spam Filtering, Fraud detection, Machine translation, Image and object recognition	Market segmentation, Music recommendation, Outlier detection

Conclusion

- Machine learning(ML) is a rapidly growing field that helps people be productive.
- The main categories of ML are Supervised, Unsupervised and Reinforcement Learning.
- Supervised learning is used to predict outcomes when we know the input and output pairs.
- We use Unsupervised learning When we need to discover new patterns with the input variables.

References

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- Das, S., Dey, A., Pal, A. and Roy, N. (2015). Applications of Artificial Intelligence in Machine Learning: Review and Prospect. International Journal of Computer Applications, [online] 115(9), pp.31–41.