

Machine Learning

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- Objective:
 - Introduce Machine Learning
- Subjects:
 - Basic Introduction:
 - Supervised versus Unsupervised Learning
 - DNN versus K-Means
 - Supervised learning:
 - Perceptron
 - Multilayer Perceptron
 - Bayesian Learning
 - Decision Trees
 - Ensembles

- Basics
 - C. Bishop, Pattern Recognition and Machine Learning, Springer-Verlag New York, 2006
- Neural Networks
 - J. A. Freeman, D. M. Skapura, Neural Networks: Algorithms, Applications, and Programming Techniques, Addison-Wesley, 1991
 - S. O. Haykin. Neural Networks and Learning Machines, Pearson, 2008
- Statistical Learning Theory
 - R. F. de Mello and M. A. Ponti, Machine Learning: A Practical Approach on the Statistical Learning Theory
 - Ulrike von Luxburg and Bernhard Schölkopf, Statistical Learning Theory: Models, Concepts, and Results, 2008
- Convex Functions and Optimization
 - Stephen Boyd and Lieven Vandenberghe, Convex Optimization, Cambridge University Press

- What is machine learning for you?
- How would you define ML?

- There are two main types of learning:
 - Supervised learning
 - Ulrike von Luxburg and Bernhard Schoelkopf, Statistical Learning Theory: Models, Concepts, and Results, Handbook for the History of Logic, Vol. 10: Inductive Logic. Elsevier, 2011
 - D. H. Wolpert and William G. Macready, 1997. No free lunch theorems for optimization. IEEE Transactions on Evolutionary Computation, 1(1), 67–82
 - Unsupervised learning
 - Gunnar Carlsson and Facundo Memoli, Characterization, Stability and Convergence of Hierarchical Clustering Methods, Journal of Machine Learning Research, 2010

- Illustrating through implementations:
 - Supervised learning
 - Distance-Weighted Nearest Neighbors (DWNN)
 - Based on the K-Nearest Neighbors
 - Unsupervised learning
 - K-Means

- Did you understand something? :)
- Questions?