


1. Supervised Learning

- Introduction to Machine Learning
- Linear regression, Normal equations
- Gradient descent
- Overfitting and regularization
- Logistic regression
- K nearest neighbors
- Naive Bayes classifier
- Cross-validation
- Decision trees
- Trees ensemble, Random Forest
- Support Vector Machines

2. Unsupervised Learning

- Intro to unsupervised learning
- Linear algebra
- Eigen decomposition, SVD (Singular Value Decomposition)
- Dimensionality reduction: PCA (Principal Component Analysis)
- Centroid based clustering: K-means, K-medians, K-medoids
- Hierarchical clustering
- Density based clustering: DBSCAN, OPTICS
- Distribution based clustering: GMM



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3. Deep learning basics

- Introduction to Deep Learning, the perceptron
- Neural network learning: Back-Propagation
- Practical network training
- Autoencoders, Batch-normalization

4. CNN, RNN, GAN and more

- Intro to CNNs, Convolution, Correlation, Filtering
- CNN architectures
- Detection and Segmentation (RCNN, YOLO etc.)
- Generative Adversarial Networks (GANs)
- Recurrent Neural networks (RNNs)
- Advanced RNN: LSTM, GRU
- Deep reinforcement learning

5. Introduction to Image Processing

- Introduction to Image Processing
- Fourier Transforms, FFT
- Filters
- Histograms, Gamma Correction
- Geometrical Operations on Images



