Machine Learning

Machine learning, a branch of artificial intelligence, concerns the construction and study of systems that can learn from data.

Knowledge item description	References
Beginner	
The concepts of machine learning, supervised learning, unsupervised learning	[1.1], [3.1]
Linear regression fundamentals	[1.2], [1.3]
Logistic regression fundamentals	[1.4]
Generative models: Naïve Bayes	[3.4], [4.2], [3.5]
Regularization fundamentals	[1.5]
Support vector machines fundamentals	[1.10]
Clustering fundamentals, k-means	[1.11], [3.12], [4.7]
Anomaly detection fundamentals, Gaussian-based anomaly detection	[1.13]
Recommender systems fundamentals. Collaborative filtering	[1.14]
Machine learning application and system design	[1.8], [1.9], [1.15], [3.19]
Competent	
Concept of neural networks	[1.6], [1.7], [2.1], [5.1]
Concept of perceptron and its limitations	[2.2]
Intuition of backpropagation algorithm	[2.3], [5.2]
Softmax output function	[2.4], [4.1], [3.1]
Optimization techniques: mini-batch gradient descent, momentum, adaptive learning rates, rmsprop	[2.6]
Advanced regularization: weight decay, noise regularizer, dropout	[2.9], [2.10], [4.5], [3.11]
Principal component analysis (PCA)	[1.12], [3.14]
Nature of regressions, probabilistic interpretation, GLM	[3.2], [3.3], [3.4], [4.1]
Nature of SVM, kernels	[3.6], [3.7], [3.8], [4.3]
Learning theory	[3.9], [3.10], [3.11], [4.4]
Mixture of Gaussians	[3.13], [4.8]
EM algorithm	[3.14], [4.9]
Expert	
Deep learning	[6.1], [7.1], [7.2]
Convolutional neural networks	[2.5], [5.15], [7.3]
Recurrent neural networks	[2.7], [7.4]
Hessian Free optimization	[2.8]
Hopfield nets	[2.11]
Boltzmann machines	[2.12]
Belief nets	[2.13]
Feature learning, stacked RBMs	[6.1], [2.14]
Autoencoders for feature learning	[5.4], [5.5], [5.6], [2.15]

Independent component analysis	[3.15]
Reinforcement learning and control	[3.13], [3.17], [3.18], [3.20]

References

#	Reference	Link
1.	Coursera Class: Machine Learning by Andrew Ng	Link
1.1.	Introduction	
1.2.	Linear Regression with One Variable	
1.3.	Linear Regression with Multiple Variables	
1.4.	Logistic Regression	
1.5.	Regularization	
1.6.	Neural Networks: Representation	
1.7.	Neural Networks: Learning	
1.8.	Advice for Applying Machine Learning	
1.9.	Machine Learning System Design	
1.10.	Support Vector Machines	
1.11.	Clustering	
1.12.	Dimensionality Reduction	
1.13.	Anomaly Detection	
1.14.	Recommender Systems	
1.15.	Large Scale Machine Learning	
2.	Coursera Class: Neural Networks for Machine Learning by Geoffrey Hinton	Link
2.1.	Lecture 1	
2.2.	Lecture 2	
2.3.	Lecture 3	
2.4.	Lecture 4	
2.5.	Lecture 5	
2.6.	Lecture 6	
2.7.	Lecture 7	
2.8.	Lecture 8	
2.9.	Lecture 9	
2.10.	Lecture 10	
2.11.	Lecture 11	
2.12.	Lecture 12	
2.13.	Lecture 13	
2.14.	Lecture 14	

2.15.	Lecture 15	
2.16.	Lecture 16	
3.	SEE: Machine Learning	Link
3.1.	Lecture 1	
3.2.	Lecture 2	
3.3.	Lecture 3	
3.4.	Lecture 4	
3.5.	Lecture 5	
3.6.	Lecture 6	
3.7.	Lecture 7	
3.8.	Lecture 8	
3.9.	Lecture 9	
3.10.	Lecture 10	
3.11.	Lecture 11	
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3.15.	Lecture 15	
3.16.	Lecture 16	
3.17.	Lecture 17	
3.18.	Lecture 18	
3.19.	Lecture 19	
3.20	Lecture 20	
4.	Stanford CS229 Machine Learning - Lecture Notes and Handouts	Link
4.1.	Lecture notes 1: Supervised Learning, Discriminative Algorithms	
4.2.	Lecture notes 2: Generative Algorithms	
4.3.	Lecture notes 3: Support Vector Machines	
4.4.	Lecture notes 4: Learning Theory	
4.5.	Lecture notes 5: Regularization and Model Selection	
4.6.	Lecture notes 6: Online Learning and the Perceptron Algorithm	
4.7.	Lecture notes 7a: Unsupervised Learning, k-means clustering	
4.8.	Lecture notes 7b: Mixture of Gaussians	
4.9.	Lecture notes 8: The EM Algorithm	
4.10.	Lecture notes 9: Factor Analysis	
4.11.	Lecture notes 10: Principal Components Analysis	
4.12.	Lecture notes 11: Independent Components Analysis	
4.13.	Lecture notes 12: Reinforcement Learning and Control	

5.	Stanford Unsupervised Feature Learning and Deep Learning Tutorial	Link
5.1.	Neural Networks	
5.2.	Backpropagation Algorithm	
5.3.	Gradient checking and advanced optimization	
5.4.	Autoencoders and Sparsity	
5.5.	Visualizing a Trained Autoencoder	
5.6.	Sparse Autoencoder Notation Summary	
5.7.	PCA	
5.8.	Softmax Regression	
5.9.	Self-Taught Learning	
5.10	From Self-Taught Learning to Deep Networks	
5.11.	Deep Networks: Overview	
5.12.	Stacked Autoencoders	
5.13.	Fine-tuning Stacked Aes	
5.14.	Linear Decoders	
5.15.	Feature extraction using convolution	
5.16.	Pooling	
6.	Web resources	
6.1.	Andrew Ng: Deep Learning, Self-Taught Learning and Unsupervised Feature Learning	Link
7.	Udacity Class: Deep Learning	Link
7.1.	Machine Learning to Deep Learning	Lecture 1
7.2.	Deep Neural Networks	Lecture 2
7.3.	Convolutional Neural Networks	Lecture 3
7.4.	Deep Models for Text and Sequences	Lecture 4

References