

AI/Machine Learning

Supervised Learning

Unsupervised Learning

Artificial Neural Network

Structured Prediction

Statistical Inference

Pattern Recognition

Probabilistic Machine Learning

Ensemble Algorithms

Ensemble learning is a machine learning paradigm where multiple learners are trained to solve the same problem. In contrast to ordinary machine learning approaches which try to learn one hypothesis from training data, ensemble methods try to construct a set of hypotheses and combine them to use.

Ensemble learning is appealing because that it is able to boost weak learners which are slightly better than random guess to strong learners which can make very accurate predictions

<https://cs.nju.edu.cn/zhouzh/zhouzh.files/publication/springerEBR09.pdf>

<http://mlg.eng.cam.ac.uk/zoubin/talks/mit12csail.pdf>

A Brief introduction to probabilistic machine learning (Thomas P. Trappenberg)

An important requirement for a natural or artificial agent is to decide on an appropriate course of action given specific circumstances, mainly the encountered environment.
We can treat the environmental circumstances as cues given to the agent. These cues are communicated by sensors that specify the values of certain features.

<https://cs.stanford.edu/people/eroberts/courses/soco/projects/neural-networks/Applications/index.html>

Character recognition, Image compression, Stock market prediction, Medicine, electronics, Security,

<http://news.mit.edu/2017/explained-neural-networks-deep-learning-0414>

Neural nets are a means of doing machine learning, in which a computer learns to perform some task by analyzing training examples. Usually, the examples have been hand-labeled in advance. An object recognition system, for instance, might be fed thousands of labeled images of cars, houses, coffee cups, and so on, and it would find visual patterns in the images that consistently correlate with particular labels.

In the past 10 years, the best-performing artificial-intelligence systems — such as the speech recognizers on smartphones or Google's latest automatic translator — have resulted from a technique called “deep learning.”

http://mlg.eng.cam.ac.uk/mlss09/mlss_slides/Hoffman_1_2.pdf

Supervised Machine Learning

Learn functional dependencies between inputs and outputs from training data (inductive inference) Most basic form: classification

Document categorization, Character recognition, Parts of speech tagging, Visual scene analysis, Protein structure prediction

<http://www.stat.yale.edu/Courses/1997-98/101/sampinf.htm>

A statistic is a number which may be computed from the data observed in a random sample without requiring the use of any unknown parameters, such as a sample mean.

The use of randomization in sampling allows for the analysis of results using the methods of statistical inference. Statistical inference is based on the laws of probability, and allows analysts to infer conclusions about a given population based on results observed through random sampling.

A parameter is a number describing a population, such as a percentage or proportion.