

Homework 1 - Applied Machine Learning

1) supervised learning.

Supervised learning is an approach to creating artificial intelligence, where a computer algorithm is trained on input data that has been labeled for a particular output. The model is trained until it can detect the underlying patterns and relationships between the input data and the output labels, enabling it to yield accurate labeling results.

Supervised learning is good at classification and regression problems, such as determining what category a news article belongs to or predicting the volume of sales for a given future date. In supervised learning, the aim is to make sense of data within the context of a specific question.

2) unsupervised learning.

Unsupervised learning is the training of a machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns, and differences without any prior training of data.

Unlike supervised learning, no teacher is provided that means no training will be given to the machine. Therefore the machine is restricted to find the hidden structure in unlabeled data by itself.

3) online learning.

Online machine learning is a type of machine learning where data is acquired sequentially and is utilized to update the best predictor for future data at each step.

In other words, online machine learning means that learning takes place as data becomes available.

With online learning, the learning algorithm's parameters are updated after learning from each individual training instance. In online learning, each learning step is quick and cheap, and the model can learn from new information in real-time as it arrives.

Online learning is ideal for machine learning systems that receive data as a continuous flow and need to be able to adapt to rapidly changing conditions.

4) batch learning or offline learning.

data is accumulated over a period of time in batch learning. The machine learning model is then trained with this accumulated data from time to time in batches. It is the direct opposite of online learning because the model is unable to learn incrementally from a stream of live data. In batch learning, the machine learning algorithm updates its parameters only after consuming batches of new data.

5) model-based learning.

Model-based machine learning is a technique for building a custom application based on a model of the problem and the different methods that could be applied to it.

The field of machine learning has seen the development of thousands of learning algorithms. Typically, scientists choose from these algorithms to solve specific problems. Their choices often being limited by their familiarity with these algorithms. In this classical/traditional framework of machine learning, scientists are constrained to making some assumptions so as to use an existing algorithm. This is in contrast to the model-based machine learning approach which seeks to create a bespoke solution tailored to each new problem.

6) instance-based learning.

These are the systems that learn the training examples by heart and then generalize to new instances based on some similarity measure. It is called instance-based because it builds the hypotheses from the training instances. It is also known as memory-based learning or lazy-learning. The time complexity of this algorithm depends upon the size of training data.