1-1-4-intro-to-ml-and-dl

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1 Machine Learning(ML)

Machine Learning is a part of Artificial Intelligence, which uses various statistical algorithms to automatically learn from data and improve from experience without being programmed manually. The machine finds the correlation between inputs or between inputs and outputs and recognizes pattern within the data which it uses to predict or cluster unseen data in future. The main thing is that the machine learns all the rules on its own without any human intervention.

2 Types of Machine Learning

There are various machine learning techniques used. They are classified mainly based on the availability of output and reward.

2.1 Supervised Learning

It is a type of Machine Learning which needs both input and output data, that is, labeled data. It uses various supervised algorithms to find a correlation between input data and output data and use it to generate a function to predict future events or classify some unseen input data. Supervised Learning is used in classification and regression tasks. For example, image classification, machine translation, image segmentation, and more.

2.2 Unsupervised Learning

It is a type of Machine Learning technique that needs only input data, that is, unlabeled data. It uses various unsupervised algorithms to find hidden structure in unlabeled data or define boundaries. Unsupervised learning is mainly used in clustering and association tasks.

2.3 Reinforcement Learning

It is a machine learning methodology where agents take action to maximize the cumulative reward; that is, the agent learns from interaction with its environment based on reward methodology. It has been used to train many gaming AI like Alpha Go.

3 Deep Learning

Deep Learning is a part of machine learning that uses multiple layers of neurons, forming a complex neural network between input and output. Deep Learning is especially a hierarchial feature learning approach. The series of layers between input and output learn feature hierarchies and is also

involved in feature identification at various levels. The inner layers learn/detect primitive feature and successive layer learns more complex features, thus making Deep Learning a perfect feature extractor.

3.1 Differences between AI, ML, DL and Data Science

Deep Learning(DL), Machine Learning(ML) and Artificial Intelligence(AI) can be thought of as Russian tea dolls where DL is placed inside ML and ML is placed inside AI, that is, DL is a subset of ML and ML is a subset of AI with AI being the superset.

ML is a part of AI which uses various statistical methods to learn with experiences(data). DL is a part of ML which uses neural networks to mimic human-like intelligent behavior. Data science is the field of science that is involved in extracting relevant information from data.

Unlike AI, ML, and DL, which are subset or superset of each other. Data science uses various ML and DL algorithms to analyze data, find the pattern in them and make confident predictions. It combines AI, ML, and DL techniques with other fields like mathematics, statistical modeling, data engineering, cloud computing, and others to get a better insight into the data.

3.2 References:

3.2.1 Documentation & Tutorial

- Deep Learning & Artificial Neural Networks
- Artificial Intelligence vs Machine Learning vs Data Science