**ASSIGNMENT-1**

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1. Do you think DL is going to replace ML in the near future? Why?

Answer: Machine Learning is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention. Deep learning is a subset of machine learning in artificial intelligence (AI) that has networks capable of learning unsupervised from data that is unstructured or unlabeled.

The main difference between deep learning and machine learning is due to the way data is presented in the system. Machine learning algorithms almost always require structured data, while deep learning networks rely on layers of ANN (artificial neural networks).

I think that DL will replace ML soon, however with some limitations. Deep Learning is the evolution of Machine Learning and it will help in making machines better than what Machine Learning does. Deep learning will push other learning algorithms to near extinction, because of the unsurpassed predictive power of deep learning especially on medium-to-large datasets. Other algorithms will become obsolete when people begin to consider deep learning as the first solution to some problems, such as pattern recognition.

However, Deep Learning models require a very large amount of data to train the model otherwise they won't work as expected. For many applications, far simpler algorithms like logistic regression or support vector machines will work just fine, and using a deep belief network will only complicate things.

I think the complexity of deep learning and its requirement of a large amount of data is still needed to be solved before Deep Learning becomes the first choice for machine learning algorithms.

2. Pros and cons of various types of learning.

Answer: Supervised learning: Supervised learning is the machine learning task of learning a function that maps an input to an output based on example input-output pairs.

Pros:

* Clarity of data and ease of training
* We can find out exactly how many classes are there before giving the data for training.
* The classifier can be trained in a way that has a perfect decision boundary to distinguish different classes accurately.
* Supervised learning can be very helpful in classification problems and to predict a target numerical value from some given data and labels.

Cons:

* It is limited in a variety of senses so that it can’t handle some of the complex tasks in machine learning.
* Training needs a lot of computation time, so do the classification, especially if the data set is very large.
* It cannot cluster or classify data by discovering its features on its own, unlike unsupervised learning.
* The accuracy of the model will be very less if a lot of good examples from each class are not selected, particularly with a large amount of training data.

UnSupervised learning: Unsupervised learning is a type of machine learning that looks for previously undetected patterns in a data set with no pre-existing labels and with a minimum of human supervision.

Pros:

* Less complexity in comparison with supervised learning. Unlike in supervised algorithms, in unsupervised learning, no one is required to understand and then to label the data inputs.
* It is often easier to get unlabeled data from a computer than labeled data, which needs person intervention.

Cons:

* Usefulness of the results; are of any value or not is difficult to confirm since no answer labels are available.
* Less accuracy of the results because the input data is not known and not labeled by people in advance, which means that the machine will need to do this alone.
* The results of the analysis cannot be ascertained because there is no prior knowledge in the unsupervised method of machine learning. Additionally, the numbers of classes are also not known.

Reinforcement Learning: Reinforcement learning is a type of machine learning that trains algorithms using a system of reward and punishment by interacting with its environment.

Pros:

* The model can correct the errors that occurred during the training process.
* Once an error is corrected by the model, the chances of occurring the same error are very less
* Reinforcement learning is intended to achieve the ideal behavior of a model within a specific context, to maximize its performance.

Cons:

* Too much reinforcement learning can lead to an overload of states which can diminish the results.
* The curse of dimensionality limits reinforcement learning heavily for real physical systems.
* Reinforcement learning needs a lot of data and a lot of computation. It is data-hungry.