# Why do we need Neural Networks and Deep Learning??

Deep Learning is a subset of Machine Learning inspired by the working of human brain (Artificial neural networks) i.e. learn from the observations, learn from the examples.
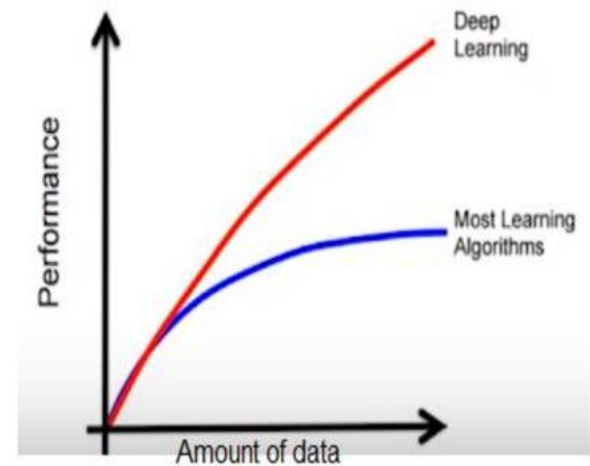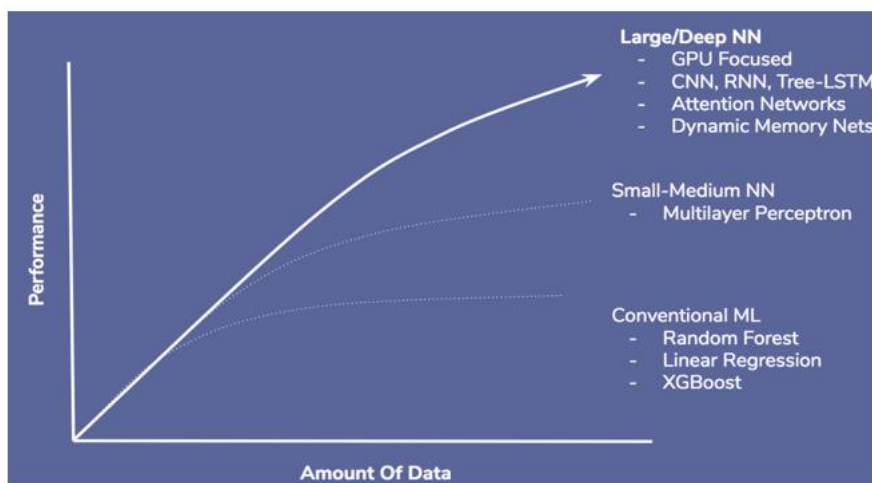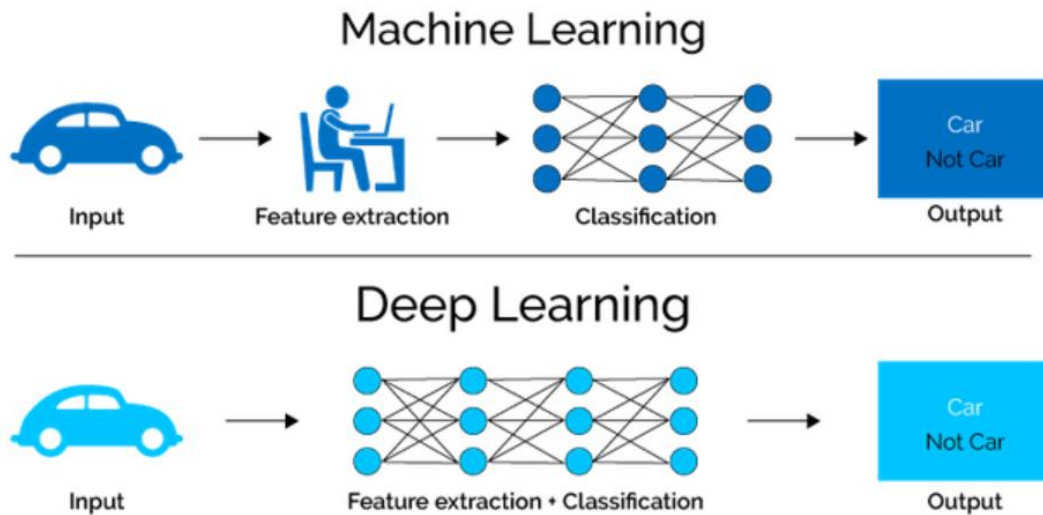
## Some Advantages of Deep Learning:

- ➢ Solve complex problems that require discovering hidden patterns in the data.
- ➢ Eliminate the need of feature engineering: Learn hidden patterns from the data by themselves, combine them together and build much efficient decision rules.
- ➢ Maximum utilization of Unstructured data: You can use different data formats to train deep learning algorithms.
- ➢ High quality results.
- ➢ Eliminate unnecessary cost: With the help of deep learning, subjective defects which are hard to train like minor product labeling errors etc. can be detected.
- ➢ Eliminate need of data labelling: Deep Learning algorithms excel at learning without any guideline.
- ➢ The same neural network-based approach can be applied to many different applications and data types.

## Some Challenges with Deep Learning:

- ➢ Requires huge amount of input data to train model.
- ➢ Requires huge processors with parallel processing power.
- ➢ Unexplained functioning of network. (Kind of black box)

➤ There is no specific rule for determining the structure of artificial neural networks. The best network structure is achieved through experience and trial and error.

➤ High Processing time.

## Machine Learning

Input → Feature extraction → Classification → Output

Car
Not Car

## Deep Learning

Input → Feature extraction + Classification → Output

Car
Not Car

# When to Use Machine Learning and when Deep Learning???

In some cases, machine learning will be better to use and, in some cases, vice-versa. Below table includes key points to understand which method should be preferred in particular situation.

## Classical Machine Learning:

- Interpretability and explainability are paramount
- Smaller amounts of relatively simple data
- Straightforward feature engineering
- Limited computational power
- Limited time, need for faster prototyping and operationalization
- Need for varied algorithm choices
- Accuracy of test dataset results is acceptable

## Deep Learning:

- Very high accuracy is a priority (and primes over straightforward interpretability and explainability)
- Large amounts of precisely labeled data
- Complex feature engineering
- Powerful compute resources available (GPU acceleration)
- Augmentation and other transformations of the initial dataset will be necessary

**References:**

https://blog.dataiku.com/when-and-when-not-to-use-deep-learning

https://becominghuman.ai/deep-learning-and-its-5-advantages-eaeee1f31c86