

# **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.

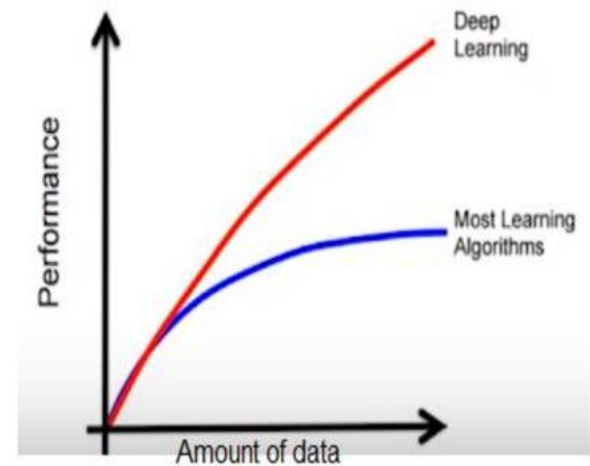
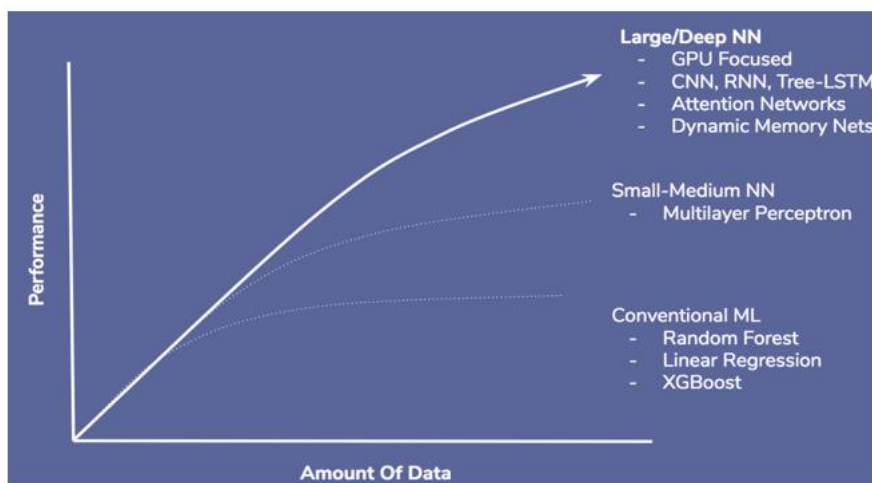
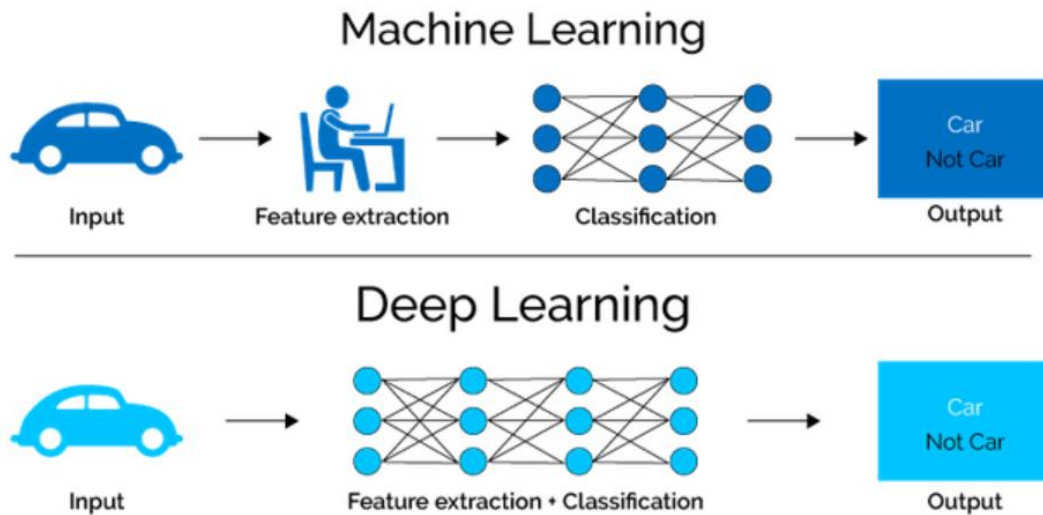
## **Some Advantages of Deep Learning:**

- 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.



# 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.

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## 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
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## References:

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

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

