Sane's STATS Academy of Statistics

Deep Learning

An Introduction

What is Deep Learning?

- Deep Learning is a branch of Machine Learning based on a set of algorithms that try to model high level and hierarchical representation of the data using:
  - Graphics
  - Different Transformations (Linear and non-linear)
- Assumptions:
  - Everything can be learnt from the data for solving any task
  - By using a very large number of simple computational units, any complex problem can be soved

How Deep Learning different than ML?

- Machine Learning requires features / predictors chosen/designed by us, whereas Deep Learning can perform directly on the raw unprocessed data
- Deep Learning is more complex set of algorithms as compared to Machine Learning
- It has its applications particularly in Image Processing, Natural Language Processing or in all places where the data is unstructured

How does Learning Happen from Data?

- Define a mathematical model with parameters $\theta = \{w_1, w_2, \ldots w_m\}$ and a loss function $J(\theta)$ (kind of a cost function) which summarises the errors by the model
- Go on changing the parameters θ in such a way that magnitude of $J(\theta)$ gets reduced to an extreme using best optimization algorithm
- A fundamental computational unit at the heart of Deep Learning is Perceptron

Neural Networks used

- Feed Forward Neural Networks
- Convolutional Neural Networks
- Recurrent Neural Networks