

## Mastering in Deep Learning

### **Module 1: Machine Learning Fundamentals**

- Machine Basics basics
- Linear algebra and Probability
- ML Supervised Algorithms
- ML Unsupervised Algorithms

### **Module 2: TensorFlow 2.0**

- Introducing Google Colab
- Tensorflow basic syntax
- Tensorflow Graphs
- Tensorboard

### **Module 3: Deep Learning**

- Introduction to Deep Learning
- What are the Limitations of Machine Learning
- Advantage of Deep Learning over Machine learning
- Reasons to go for Deep Learning
- Real-Life use cases of Deep Learning

### **Module 4 : Deep Learning Networks**

- What is Deep Learning Networks
- Why Deep Learning Networks
- How Deep Learning Works
- Feature Extraction
- Working of Deep Network
- Training using Backpropagation
- Variants of Gradient Descent
- Types of Deep Networks
- Feed forward neural networks (FNN)
- Convolutional neural networks (CNN)
- Recurrent Neural networks (RNN)
- Generative Adversarial Neural Networks (GAN)
- Restricted Boltzmann Machine (RBM)

## **Module 5: Neural Networks**

- Introduction to Perceptron
- History of Neural networks
- Activation functions
- Sigmoid
- Relu
- Softmax
- Leaky Relu
- Tanh
- Gradient Descent
- Learning Rate and tuning
- Optimization functions
- Back propagation and chain rule
- Fully connected layer
- Cross entropy
- Weight Initialization

## **Module 6:- Deep Neural Networks**

- Deep L-layer Neural Network
- Forward Propagation in a Deep Network
- Getting your Matrix Dimensions Right
- Why Deep Representations?
- Building Blocks of Deep Neural Networks
- Forward and Backward Propagation
- Parameters vs Hyperparameters

## **Module 7: Artificial Neural Network (ANN)**

- What is Artificial Neural Networks
- Machine Learning Vs Artificial Neural Networks
- History of ANN
- Building Blocks
- Network Topology
- Evaluating the ANN
- Improving and tuning the ANN

### **Module 8: Convolutional Neural Networks (CNN)**

- Introduction to Convolutional Neural Networks
- CNN Applications
- Architecture of a Convolutional Neural Network
- Convolution and Pooling layers in a CNN
- Understanding and Visualizing CNN
- Transfer Learning and Fine-tuning Convolutional Neural Networks

### **Module 9: Recurrent Neural Network (RNN)**

- Intro to RNN Model
- Application use cases of RNN
- Modelling sequences
- Training RNNs with Backpropagation
- Long Short-Term Memory (LSTM)
- Recursive Neural Tensor Network Theory
- Recurrent Neural Network Model
- Time Series Forecasting

### **Module 10: Hyperparameter Tuning, Regularization**

- Practical Aspects of Deep Learning
- Discover and experiment with a variety of different initialization methods, apply L2 regularisation and dropout to avoid model overfitting, then apply gradient checking to identify errors in a fraud detection model.
- Train / Dev / Test sets
- Bias / Variance
- Basic Recipe for Machine Learning
- Regularisation
- Why Regularization Reduces Overfitting?
- Dropout Regularisation
- Understanding Dropout
- Other Regularization Methods

## **Module 11:- Optimization Algorithms**

- Mini-batch Gradient Descent
- Understanding Mini-batch Gradient Descent
- Exponentially Weighted Averages
- Understanding Exponentially Weighted Averages
- Bias Correction in Exponentially Weighted Averages
- Gradient Descent with Momentum