

# MACHINE LEARNING TRAINING COURSE CONTENT

## Section 1: Introduction to ML

- What is ML?
- Why ML?
- Opportunities in ML
- What is ML models?
- Why R and Python is popular?

## Section 2: ML Model Overview

- Introduction to ML Model.
- Data Handling
- Data Pre-processing
- Types of ML Model.
- Supervised and Unsupervised.
- How to test your Data?
- Cross validation techniques

## Section 3: Linear Regression

- What is Linear Regression?
- Gradient Descent overview.
- Gradient Descent Calculations.
- R and Python Overview.
- How to improve your model?

## Section 4: Overfitting

- Overfitting Overview
- How to use Linear Regression for Overfitting?
- How to avoid Overfitting?
- Bias-Variance Tradeoff.
- Regularization - Ridge, LASSO
- ANOVA, F tests overview.
- What is Logistic Regression?
- Classification with Logistic Regression.

- Maximum Likelihood Estimation.
- Build an end to end model with Logistic Regression using scikit Learn.
- How to build a model in the Industry?

## Section 5: Decision Trees

- Why Decision Tree?
- Entropy, Gini Impurity overview
- Implement Overfitting.
- How to improve the Decision Tree model without Overfitting?
- Bagging, Boosting
- Random Forest
- AdaBoost, Gradient Boost

## Section 6: k-NN

- Distance based model with kNN.
- Value of k - overview.

## Section 7: Support Vector Machines(SVM)

- Power of SVM overview.
- Why SVM?
- What is Kernel Functions?
- What are the Kernel Functions available?
- How to Build an OCR(Optical Character Reader) with the help of SVM and Kernel functions?
- Neural Networks overview.
- Why Neural Networks?
- What is Neural Network Architecture?
- How to build AND, OR, NOT, XOR, XNOR Logic Gates with Neural Network?
- What is Forward & Backward Propagation?
- List of Activation Functions.
- Vanishing Gradient problem

## Section 8: Deep Neural Networks

- Optimization methods overview.
- Gradient Descent with Momentum, RMSProp, ADAM.
- Learning Rate Decay.

- Xavier Initialization.
- Introduction to Keras and Tensorflow(TF)
- Deep Learning in Keras with TensorFlow as the backend.

## Section 9: Unsupervised Learning

- Clustering overview.
- k-means Clustering.
- Hierarchical clustering.

## Section 10: PCA

- Principal Component Analysis(PCA).
- Maths behind PCA.
- Engine Recommendation.
- Content and Collaborative Filtering.
- Market Basket Analysis
- What is Apriori Rule?

## Section 11: Computer Vision

- Image Detection, Image Classification, Localization.
- Convolutional Neural Networks(CNN) overview.
- Strides, Padding methods
- Convolutional, Padding and Fully Connected layers
- Sliding Window
- Edge Detection

## Section 12: Advanced Computer Vision

- YOLO ALgorithm - You Only Look Once
- Introduction to classical networks like LeNet5
- IoU
- Introduction to Natural Language Processing(NLP)
- Text Preprocessing
- Lemmatization, Stemming
- Syntactical Parsing, Entity Parsing
- Develop a chatbot with the above concepts of NLP and Neural Networks