

**Course Name****Artificial Intelligence and Machine Learning****Course Objective**

1. To make the learner identify potential zones of uses of AI and ML.
2. Providing experience of working with real time applications of Artificial Intelligence and Machine Learning to the learner.
3. Make a learner easily land up to a job role of either Data Scientist, Machine Learning Engineer, NLP Expert in IT Industry.

**Course Overview**

The Course covers –

1. Machine Learning Algorithms
2. Supervised Learning – Linear Regression, Logistic Regression, SVM, Decision Tree, Random Forest and ANN
3. Unsupervised Learning Algorithms – K Means, DBSCAN, Anomaly Detection, PCA
4. Time Series Forecasting
5. NLP – Sentiment Analysis, Chatbots
6. Computer Vision – Face Recognition, Emotion Detection

**Course Outcome**

After completion of this course –

1. The learner will be able to land up in a job role related to Artificial Intelligence, Machine Learning and Data Science.
2. The learner can easily get into other relevant courses such as Deep Learning and Self Driving Car.
3. The Learner can also easily switch from existing job role with around of 20% hike from the current salary switch to any of the field where AI and Machine Learning is being used.
4. The learner will become capable of handling any project relevant to AI and ML in a proper way.

**Course Code (to be filled by TechTrunk Ventures)**

TTV/IND/00025

**Duration**

60 Hours for online Live Training

**Modules**

20 Modules (3 Hours Each for online Training)

**Prerequisite**

Basic Understanding of Python Programming Language.

**Machine Requirement** Windows Machine (Windows 7 or Above) /Linux Machine  
Only 64 Bit  
4 GB RAM (8 GB Recommended)

**Software used** Python 3.x  
**Software Free/Licensed** FREE  
**If licensed, Is demo version available** FREE  
**Download link** <https://www.python.org/ftp/python/3.7.0/python-3.7.0.exe>

More python packages needs to be installed, the details of which will provided to the learner

**Any extra hardware other than PC required (If Yes kindly mention the list of hardware components required)**

NO

**Hands on** 80%

**Projects Covered** 5

**12 Possible Project (Number of projects covered will be the count mentioned in above)**

1. Churn Prediction for an Enterprise
2. Real time Emotion Detection from speech and Face
3. Real time Brand Analysis from Social Media Data
4. Criminal Detection System using Face Recognition
5. Smart Factory – Predictive Maintenance
6. IPL Prediction using Machine Learning
7. Enron Fraud Detection
8. Credit card Fraud Detection
9. Tumor Detection from Brain MRI Images
10. Utility based Chatbot
11. Support Ticket Classification system
12. Character Recognition

**Study Material**

1. PPTs
2. Practice Examples
3. Reading Material in softcopy
4. Project Codes

**Suggested relevant courses after taking this course:**

1. Deep Learning
2. Application Development using Python

**Suggested Job Profile after taking this course:**

1. Data Scientist
2. Machine Learning Engineer
3. AI Engineer
4. NLP Expert
5. Data Analyst
6. BI Professional

**Any other relevant information**

7. R & D Professional

1. Life time access to LMS
2. 24\*7 Technical Support
3. Python course will be complementary

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Detailed Content:

<p><b>Module 1</b> Introduction</p> <p>Duration: 3 Hours</p>	<p>Artificial Intelligence &amp; Machine Learning Introduction Who uses AI? AI for Banking &amp; Finance, Manufacturing, Healthcare, Retail and Supply Chain AI v/s ML v/s DL and Data Science Typical applications of Machine Learning for optimizing IT Operations Supervised &amp; Unsupervised Learning Reinforcement Learning Regression &amp; Classification Problems Clustering and Anomaly Detection Recommendation System What makes a Machine Learning Expert? What to learn to become a Machine Learning Developer?</p>
<p><b>Module 2</b> Math for Machine Learning – Statistics Basics</p> <p>Duration: 3 Hours</p>	<p>Types of variable Categorical and Continuous Data Ratio and Interval Nominal and Ordinal Data Measure of Central Tendency – Mean, Mode and Median Percentile and Quartile Measure of Spread – IQR, Variance and Standard Deviation Empirical Rule Chebyshev's Theorem Z Test Coefficient of Variation Kurtosis and Skewness</p>
<p>Assignment 1</p>	
<p><b>Module 3</b> Math for Machine Learning – Analysing Data using Statistics &amp; Probabilistic Analysis</p> <p>Duration: 3 Hours</p>	<p><b>Analysing Categorical and Continuous Data</b> Proportional Test Chi Square Test Covariance Correlation T Test Anova</p> <p><b>Probabilistic Analysis</b> Events and their Probabilities Rules of Probability Conditional Probability and Independence</p>

	<p>Bayes Theorem  Moment Generating Functions Central Limit Theorem  Expectation &amp; Variance  Standard Distributions – Bernoulli, Binomial &amp; Multinomial</p>
<p><b>Module 4</b>  Introduction to Python programming    Duration: 3 Hours</p>	<p>Introduction to Python Programming  What is Python?  Understanding the Spyder Integrated Development Environment (IDE)  Python basics and string manipulation lists, tuples, dictionaries, variables  Control Structure – If loop, For loop and while Loop  Single line loops  Writing user defined functions  Object oriented programming with Python</p>
<p><b>Assignment 2</b></p>	
<p><b>Module 5</b>  Python for Data handling – numpy and Pandas    Duration: 3 Hours</p>	<p><b>Mathematical Computing with Numpy</b>  NumPy Overview  Properties, Purpose, and Types of ndarray  Class and Attributes of ndarray Object  Basic Operations: Concept and Examples  Accessing Array Elements: Indexing, Slicing, Iteration, Indexing with Boolean Arrays  Copy and Views  Universal Functions (ufunc)  Shape Manipulation &amp; Broadcasting  Linear Algebra using numpy  Stacking and resizing the array</p> <p><b>Introduction to Pandas</b>  Data Structures  Series, DataFrame &amp; Panel  DataFrame basic properties  Importing excel sheets, csv files, executing sql queries  Importing and exporting json files  Selection of columns  Filtering Dataframes  Handling Missing Values  Finding unique values and deleting duplicates</p>

<p><b>Module 6</b>  Python for Data Handling  – pandas  Data Visualization with  matplotlib and seaborn</p> <p>Duration: 3 Hours</p>	<p>Descriptive Analysis with pandas  Creating new categorical features from continuous variable  groupby operations  groupby statistical Analysis  Apply method  String Manipulation</p> <p><b>Introduction to Data Visualization</b>  Matplotlib Features:  Line Properties Plot with (x, y)  Controlling Line Patterns and Colors  Set Axis, Labels, and Legend Properties  Alpha and Annotation  Multiple Plots  Subplots  Types of Plots and Seaborn  Boxplots  Distribution Plots  Clustermaps  Heatmaps  Violin plots  Swarmplots and countplots</p>
<p><b>Assignment 3</b></p>	
<p><b>Module 7</b>  Linear Regression</p> <p>Duration: 3 Hours</p>	<p>Regression Problem Analysis  Mathematical modelling of Regression Model  OLS method for Linear Regression  Finding the coefficients and intercept  Gradient Descent Algorithm  Programming Process Flow  Use cases  Programming Using python  Bifurcate Data into Training / Testing Data set  Build Model on Training Data Set  Predict using Testing Data Set  Validate the Model Performance  Building simple Univariate Linear Regression Model</p>
<p><b>Module 8</b>  Linear Regression</p> <p>Duration: 3 Hours</p>	<p>Multivariate Regression Model  Correlation Analysis – Analyzing the dependence of variables  Apply Data Transformations  L1 &amp; L2 Regularization  Identify Multicollinearity in Data Treatment on Data</p>

	<p>Identify Heteroscedasticity  Modelling of Data  Variable Significance Identification  Model Significance Test  R2, MAPE, RMSE  Project: Predictive Analysis using Linear Regression</p>
<p><b>Module 9</b>  Logistic Regression    Duration: 3 Hours</p>	<p>Classification Problem Analysis  Variable and Model Significance  Sigmoidal Function  Maximum Likelihood Concept  Null Vs Residual Deviance  Cost Function Formation  Mathematical Modelling</p> <p>Model Parameter Significance Evaluation  Accuracy, recall, precision and F1 Score  Drawing the ROC Curve  Estimating the Classification Model Hit Ratio  Isolating the Classifier for Optimum Results  Project: Predictive Analysis using Logistic Regression</p>
<p>Assignment 4</p>	
<p><b>Module 10</b>  KNN and Decision Tree    Duration: 3 Hours</p>	<p><b>K Nearest Neighbour</b>  Understanding the KNN  Distance metrics  Case Study on KNN  Example with Python</p> <p><b>Decision Trees</b>  Forming Decision Tree  Components of Decision Tree  Mathematics of Decision Tree  Variance – Decision Tree for Regression  Gini Impurity, Chi Square – Decision Tree for Classification  Decision Tree Evaluation</p>
<p><b>Module 11</b>  Decision Tree and  Random Forest    Duration: 3 Hours</p>	<p><b>Decision Tree</b>  Practical Examples &amp; Case Study  Project: Financial Prediction with Decision Tree</p> <p><b>Random Forest</b></p>

	<p>Bag of Trees  Random Forest Mathematics  Examples &amp; use cases using Random Forests  Case Study:  Bank Marketing Analysis  Customer Churn Analysis</p>
<p><b>Module 12</b>  Artificial Neural Networks    Duration: 3 Hours</p>	<p>Neurons, ANN &amp; Working  Single Layer Perceptron Model  Multilayer Neural Network  Feed Forward Neural Network  Cost Function Formation  Applying Gradient Descent Algorithm  Backpropagation Algorithm &amp; Mathematical Modelling  Programming Flow for backpropagation algorithm  Use Cases of ANN  Programming SLNN using Python  Programming MLNN using Python  Diabetes Data Predictive Analysis using ANN  Project – Predictive Analysis with Neural Networks</p>
<p><b>Assignment 5</b></p>	
<p><b>Module 13</b>  Support Vector Machines    Duration: 3 Hours</p>	<p>Concept and Working Principle  Mathematical Modelling  Optimization Function Formation  Slack Variable  The Kernel Method and Nonlinear Hyperplanes  Use Cases  Programming SVM using Python  Project - Character recognition using SVM</p>
<p><b>Module 14</b>  Image Processing with Opencv    Duration: 3 Hours</p>	<p>Image Processing with Opencv  Image Acquisition and manipulation using opencv  Video Processing  Edge Detection  Corner Detection  Face Detection  Image Scaling for ANN  Face Detection in an image frame  Object detection  Training ANN with Images  Character Recognition</p>



## Assignment 6

<b>Module 15</b> Time Series Prediction  Duration: 3 Hours	Definition of Time Series Time Series Decomposition Simple Moving Average Method Weighted Moving Average Method Single Exponential Smoothing Method Double Exponential Smoothing Method Triple Exponential Smoothing Method Stationarity of Data ARIMA Models
<b>Module 16</b> Unsupervised Learning – Clustering  Duration: 3 Hours	<b>Clustering</b> Application of clustering DBSCAN Hierarchical Clustering K Means Clustering Use Cases for K Means Clustering Programming for K Means using Python Image Color Quantization using K Means Clustering Technique Customer segmentation using KMeans Cluster Size Optimization vs Definition Optimization Projects & Case Studies
<b>Module 17</b> Principal Component Analysis and Anomaly Detection  Duration: 3 Hours	<b>Principal Component Analysis</b> Dimensionality Reduction, Data Compression Curse of dimensionality Multicollinearity Factor Analysis Concept and Mathematical modelling Use Cases Programming using Python  <b>Anomaly Detection</b> Moving Average Filtering Mean, Standard Deviation Statistical approach for Anomaly Detection OneClass SVM for Anomaly Detection Isolation Forest for Anomaly Detection Hands on project on Anomaly Detection Do's and Don'ts for Anomaly Detection

## Assignment 7

### Module 18

Natural Language Processing

Duration: 3 Hours

Natural Language Processing & Generation  
Semantic Analysis and Syntactic Analysis  
Text Cleaning and Preprocessing using Regex  
Using NLTK & Textblob  
Basic Text data processing  
Tokenization, Stemming and Lemmatization  
Pos Tagging  
Tf-IDF, count vector and Word2vec  
Sentiment Analysis  
Using Google, Bing and IBM Speech to Text APIs  
Project: Streaming live tweets and Sentiment Analysis  
Wordcloud  
Project: Building an Email Classification Model  
Chatbots  
Building Chatbots using Dialog Flow and Facebook Messenger  
Facebook Messenger API Integration  
Project: Building a utility based chatbot

## Assignment 8

### Module 19 & 20

Projects

Duration: 6 Hours

Working Final Project  
Do's and Don'ts with Machine Learning  
Productization of Machine Learning Application

*Thank you for query*

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For any query please feel free to reach us

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