Course Name	Artificial Intelligence, Machine Learning and Deep Learning
Course Objective	1. To make the learner identify potential zones of uses of AI, ML and DL. 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, Deep Learning Engineer 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 7. Recommendation Systems 8. Working with Tensorflow, Theano and keras 9. GPU Computing 10. Boosting and Bagging 11. CNN 12. RNN and LSTM
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.
	5. The learner will hae complete idea of implementing Deep Learning Algorithms
Course Code (to be filled by TechTrunk Ventures)	TTV/IND/00026
Duration	90 Hours for online Training
Modules	30 Modules (3 Hours Modules)
Prerequisite	Basic Understanding of Programming Language.
Machine Requirement	Windows Machine (Windows 7 or Above) /Linux Machine Only 64 Bit 4 GB RAM (Recommended 8 GB) NVIDIA Graphics Card (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 There are python package installation guides which will be made available to learner.
Any extra hardware other than PC required **(If Yes kindly mention the list of hardware components required)**	NO
Hands on	75%
Projects Covered	7
20 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

	13. Self-Driving Car
	14. Bitcoin Prices Prediction
	15. Object Detection using LSTM
	16. Deep Learning based Face Recognition
	17. CIFAR Object Detection
	18. Image Recolouring
	19. Sentiment Analysis using Deep Learning
	20. Chatbots using Deep learning
Study Material	1. PPTs
	2. Practice Examples
	3. Reading Material in softcopy
	4. Project Codes
Suggested relevant courses after taking this course:	1. 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
	7. R & D Professional
	8. Deep Learning Engineer
	9. Deep Learning Expert
	10. Self-Driving Car Engineer
Any other relevant information	1. Life time access to LMS
	2. 24*7 Technical Support
	3. Python course will be complementary

Detailed Content:

Module 1 Introduction Duration: 3 Hours	Artificial Intelligence & Machine Learning Introduction Who uses AI? AI for Banking & 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 & Unsupervised Learning Reinforcement Learning Regression & Classification Problems Clustering and Anomaly Detection Recommendation System What makes a Machine Learning Expert? What to learn to become a Machine Learning Developer?
Module 2 Math for Machine Learning – Statistics Basics Duration: 3 Hours	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
Assignment 1
Module 3 Math for Machine Learning – Analysing Data using Statistics & Probabilistic Analysis Duration: 3 Hours	**Analysing Categorical and Continuous Data** Proportional Test Chi Square Test Covariance Correlation T Test Anova **Probabilistic Analysis** Events and their Probabilities Rules of Probability Conditional Probability and Independence

	Bayes Theorem Moment Generating Functions Central Limit Theorem Expectation & Variance Standard Distributions – Bernoulli, Binomial & Multinomial
Module 4 Introduction to Python programming Duration: 3 Hours	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

Assignment 2

Module 5 Python for Data handling – numpy and Pandas Duration: 3 Hours	**Mathematical Computing with Numpy** 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 & Broadcasting Linear Algebra using numpy Stacking and resizing the array **Introduction to Pandas** Data Structures Series, DataFrame & 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

Module 6 Python for Data Handling – pandas Data Visualization with matplotlib and seaborn Duration: 3 Hours	Descriptive Analysis with pandas Creating new categorical features from continuous variable groupby operations groupby statistical Analysis Apply method String Manipulation **Introduction to Data Visualization** 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 Voilin plots Swarmplots and countplots
Assignment 3	
Module 7 Linear Regression Duration: 3 Hours	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
Module 8 Linear Regression Duration: 3 Hours	Multivariate Regression Model Correlation Analysis – Analyzing the dependence of variables Apply Data Transformations L1 & L2 Regularization Identify Multicollinearity in Data Treatment on Data

	Identify Heteroscedasticity Modelling of Data Variable Significance Identification Model Significance Test R2, MAPE, RMSE Project: Predictive Analysis using Linear Regression
Module 9 Logistic Regression Duration: 3 Hours	Classification Problem Analysis Variable and Model Significance Sigmoidal Function Maximum Likelihood Concept Null Vs Residual Deviance Cost Function Formation Mathematical Modelling 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
Assignment 4	

Module 10 KNN and Decision Tree Duration: 3 Hours	**K Nearest Neighbour** Understanding the KNN Distance metrics Case Study on KNN Example with Python **Decision Trees** 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
Module 11 Decision Tree and Random Forest Duration: 3 Hours	**Decision Tree** Practical Examples & Case Study Project: Financial Prediction with Decision Tree **Random Forest**

	Bag of Trees Random Forest Mathematics Examples & use cases using Random Forests Case Study: Bank Marketing Analysis Customer Churn Analysis
Assignment 5	
Module 12 Artificial Neural Networks Duration: 3 Hours	Neurons, ANN & Working Single Layer Perceptron Model Multilayer Neural Network Feed Forward Neural Network Cost Function Formation Applying Gradient Descent Algorithm Backpropagation Algorithm & Mathematical Modelling Programming Flow for backpropagation algorithm Use Cases of ANN Programming SLNN using Python Programming MLNN using Python Project – Predictive Analysis with Neural Networks
Module 13 Support Vector Machines Duration: 3 Hours	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
Module 14 Image Processing with Opencv Duration: 3 Hours	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

Assignment 6	
Module 15 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
Module 16 Unsupervised Learning – Clustering Duration: 3 Hours	**Clustering** 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
Module 17 Principal Component Analysis and Anomaly Detection Duration: 3 Hours	**Principal Component Analysis** Dimensionality Reduction, Data Compression Curse of dimensionality Multicollinearity Factor Analysis Concept and Mathematical modelling Use Cases Programming using Python **Anomaly Detection** 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

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

Module 19 Recommendation Systems Duration: 3 Hours	Introduction to Recommendation System Popularity based Filtering Content based Filtering Collaborative Filtering Examples and Use cases Project: Movie Recommendation System
Module 20 Working with Tensorflow and Theano Duration: 3 Hours	Introduction to TensorFlow & Theano The Programming Model Data Model, Tensor Board Working with constants, variables and placeholders Linear Regression using Tensorflow Logistic Regression using Tensorflow Tensorflow low level APIs Data manipulation using Tensorflow Working with Theano Building Linear Regression and Logistic Regression with Theano Examples and use cases

Module 21 Neural Network Revisiting Duration: 3 Hours	Activation Functions for Neural Networks Optimization Techniques – SGD, ADAM, LBFGS Regularization Momentum in Neural Networks Neural Network Tuning and Performance Optimization Introducing Feed Forward Neural Nets Softmax Classifier & ReLU Classifier Dropout Optimization Back propagation Neural networks with Tensorlfow Deep Neural Networks using Tensorflow
Assignment 9	
Module 22 Bagging and Boosting Duration: 3 Hours	Gradient Boosting Methods GBM – idea and beefits XGBoost LightGBM CatBoost
Module 23 Deep Learning Introduction and Convolutional Neural Networks Duration: 3 Hours	Convolutional Neural Networks CNN Architecture Convolution Process MaxPooling, dropout Maths behind CNNs Feature Extraction Variants of the Basic Convolution Function Efficient Convolution Algorithms The Neuroscientific Basis for Convolutional Networks Variety of Convolutional Networks Implementing CNNs using Keras MNIST Data – Digit Classification using CNN
Assignment 10	
Module 24 Recurrent Neural Networks Duration: 3 Hours	Recurrent Neural Networks Basic concepts of RNN Unfolding Recurrent Neural Networks The Vanishing Gradient Problem The Exploding Gradient Problem LSTM Networks Recursive Neural Networks

	Case study Basic Time Series Forecasting using LSTM Bitcoin Prices prediction using LSTM Airlines Volume Prediction using LSTM
Module 25 Recurrent Neural Networks Duration: 3 Hours	LSTM for NLP Word Embedding and LSTM Text Classification using LSTM Project: IMDB Feedback classification Word2vec Word Embedding Text Classification using LSTM Text Summarization using LSTMs Concept and methods Sequence to Sequence Model using LSTMs
Assignment 11	
Module 26 Autoencoders & RBM – Concept, Mathematics, Programming & Example Duration: 3 Hours	Autoencoders, RBM Introducing Autoencoders Representational Power, Layer Size and Depth Stochastic Encoders and Decoders Improving Autoencoders Case study Restricted Boltzmann Machines Maths behind RBM Concept of Boltzman Machine Programming RBM Self-Organizing Maps Example and Use cases Programming SOMs using Keras
Assignment 12	
Module 27 and 28 Projects Duration: 6 Hours	Project Work
Module 29 & 30	Project Work

Projects	
Duration: 6 Hours	Do's and Don'ts with Machine Learning Default Baseline Models Determining Whether to Gather More Data Selecting Hyperparameters Debugging Strategies Large Scale Productization of Machine Learning/ Deep Learning Application

Thank you for query

For any query please feel free to reach us

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