

Machine Learning with Python

Certification Course

1. Machine Learning Foundation:

- **Python for Machine Learning:** Flow, Conditions & Loops, Variables, Operations, Functions, Data structures (Array, Lists, Strings, Sets, Dictionary, Tuples, Series, Tensors), Data Frame Manipulation and Data Visualization.
- **Mathematics for Machine learning:**
 - Linear Algebra
 - Multivariate calculus
 - Probability theory and Probability Distributions
 - Matrices, Vectors and their application for Data Analysis.
- **Computer Science & Algorithms:** Matrix implementation/ Data Structures & Algorithms
- Functions and Graphs
- **Statistics and it's applications**
- Hypothesis Testing

2. Getting Started with Machine Learning

- What is Machine Learning– Examples and Applications
- Learning **Numpy, Pandas, Scikit Learn** Python libraries
- Learning **Matplotlib** Python Library for data visualization
- Machine Learning prediction modeling and algorithms
- Cost Function, Metrics for Model Evaluation and Validation
- Model Training and Testing
- Model Overfitting - Underfitting
- Model Bias & Variance
- Gradient Descent Optimization & Learning Rate
- Hyper-parameters Tuning & Model Optimization
- Projects to understand and implement Machine Learning Basics

3. Data Exploration - Data Preprocessing & Feature Engineering

- Data Extraction, Transformation, and Loading
- Data Wrangling and Data Exploration.
- Data Pre-processing
- Data Visualization
- Feature Selection
- Feature Transformations
- Outlier Detection and Handling
- Handling Missing Values

4. Supervised Learning

- Introduction to Supervised Learning
- Linear Regression
- Logistic Regression

- Decision Trees
- Random Forests
- Naïve Bayes Classifier
- Bayesian Statistics and Inference
- K-Nearest Neighbor
- Support Vector Machine – SVM
- One mini project hands-on for each algorithm

5. Unsupervised Learning

- Introduction to Unsupervised Learning
- K-Means Clustering
- Agglomerative Hierarchical Clustering
- Clustering using DBSCAN
- Expectation–Maximization (EM) Clustering using Gaussian Mixture Models (GMM)
- Clustering Mini-Project

6. Dimensionality Reduction

- PCA
- LDA
- Kernel PCA
- SMOTE

7. Ensemble, Bagging & Boosting

- k-fold Cross Validation
- Grid Search
- Bagging & Boosting
- ADA boost
- XGBoost
- Light GBM
- Ensembling Techniques
- Stacking

8. Deep Learning

- Introduction to Deep Learning
- Introduction to **Google Colab**
- Machine Learning VS Deep Learning
- Introduction to Neural Networks
- TensorFlow/Theano/Keras
- Deep Neural networks
- Forward propagation and Back Propagation Learning
- Training & evaluation with the built-in methods

9. Deploy Machine Learning models in to production

- Different Approaches to Deploying Machine Learning Models in Production
- System Architecture, Component Integration and Data Pipeline
- Batch vs. Real-time Prediction
- Best Practices and Industry Standards
- Deploy Machine Learning models Using Flask Rest API on Heroku Server
 - What are APIs
 - Environment Setup & Flask Basics
 - Creating a Machine Learning Model
 - Saving the Machine Learning Model: Serialization & Deserialization
 - Creating an API using Flask
 - Test Flask App Locally
 - Deploy to Heroku
 - Test Working App

10. Machine Learning projects bucket:

- Advance House price Prediction Project
- Loan Approval Classification Project
- Breast Cancer Detection Project
- Mushroom Classification Project
- IRISH Flower Multi Classification Project
- Wine Multi Classification Project
- Diabetes Prediction Project
- Titanic Survival Project
- Credit Card Fraud Detection Project
- Mall Customer Segmentation
- Image Classification on Flower Data set
- Cats and Dogs Image Classification
- Covid19 Global Forecasting and Analysis

11. Kaggle Competitions and Hackathons

- Introduction to Kaggle Platform and other Data Science Competitions
- Machine Learning Live competitions at Kaggle