6 Weeks Machine Learning – Zero to Hero

Week 1 – Python Programming

Module 1 - Installation of Python on Anaconda Platform

- Introduction to installation of Anaconda
- Introduction to Python Editors & IDE's (Anaconda, Jupyter etc...)
- Understand Jupyter notebook.
- Overview of Python- Starting with Python
- Exploring different IDE for Python

Module 2 - Data Types and Variables

- Primitive and Core Datatype
- Mutable and Immutable Data Types
- Core built-in data structures – Lists, Tuples, Dictionaries, Sets
- Working with list, tuple, dictionaries and sets and explore different functions and methods.

Module 3 – String and Conditional Statement in Python

- String
- String built-in methods
- String formatting using format function
- If – Else Statement | Single Hand if else

Module 4 – Loops and Functions in Python

- What are Loops
- While Loop
- For Loop
- What are Functions and its use?
- Types of Functions
- Examples

Module 5 – File Handling and Comprehension

- What is file handling?
- Open file, read file, modify, delete file.
- List Comprehension, Set Comprehension
- Lambda Function

Module 7 – Object Oriented Programming

- What is OOPS
- Concept of Class, Objects, Methods
- Inheritance and its types | MRO – Method Resolution Order

Module 8 – Django – Web Development

- Installing Django and making basic app
- Understanding Django File Structure
- Making simple static web page
- Taking input from user in web app

Module 9 – Django – Continued

- Understanding Django Admin
- Making a dynamic website
- Connecting Mysql to webpage
- Loading data from MySql to Website

Week 2 – Data Analysis with MySQL

Module 1 - Introduction

- MySQL Installation and Introduction
- Use of MySQL
- Working of MySQL | Features
- MySQL Datatypes | Variables
- MySQL Connection

Module 2 – MySQL User Management

- Create User | Grant Privileges to User
- Show All Users | Drop User | Change User Password

Module 3 – MySQL Database

- Create Database | Select | Show Database
- Drop | Copy Database

Module 4 – Table & Views

- Create Table | Alter Table – Add/Delete/Modify Column in Table
- Show Tables | Rename Table | TRUNCATE Table | Describe Table | DROP Table | Copy Table
- MySQL Views – Create | Update | Drop | Select Views

Module 5 – MySQL Key

- Unique Key
- Primary Key
- Composite Key
- Foreign Key

Module 6 –MySQL Queries & Constraints

- Select | Insert | Update | Delete | Alter | Truncate | Drop | Replace Queries
- Insert Into Select Query
- Exploring different MySQL constraints

Module 7 – MySQL Clauses

- MySQL WHERE | MySQL HAVING
- MySQL DISTINCT | MySQL FROM
- MySQL ORDER BY | MySQL GROUP BY

Module 8 – MySQL - Control Flow Function and Conditions

- MySQL IF() | MySQL IFNULL()
- MySQL NULLIF() | MySQL CASE
- MySQL IF Statement
- MySQL Conditions

Module 9 – MySQL - Joins

- MySQL Inner Join | MySQL Left Join | MySQL Right Join
- MySQL CROSS JOIN - MySQL SELF JOIN - MySQL DELETE JOIN - MySQL Update Join

Module 10 – MySQL - Aggregate Functions

- MySQL count() | MySQL sum() | MySQL avg()
- MySQL min() | MySQL max() | MySQL GROUP_CONCAT()
- MySQL first() | MySQL last()

Week 3 – Data Analysis with Python

Module 1 - NumPy

- Installing Numpy | Introduction to Numpy Arrays
- Different operation and functions on Numpy Arrays
- Numpy operations and different functions
- Creating different arrays using Numpy
- Array Indexing and Slicing | Array Functions and Methods
- Different Mathematical Functions | Different Matrix Operations
- Random Numbers | Generate Numbers between a range.

Module 2 - Introduction to Pandas for Data Analysis

- Installing Pandas | Pandas Introduction
- Use of Pandas for Data Analysis
- Series vs DataFrames
- Reading data from CSV and TXT file and databases

Module 3 - Pandas (Series)

- Concept Of Series in Pandas | Creating Series using Pandas
- Series vs List, Series Operations
- Different Functions in Series | Sorting of Series
- Extracting Values from Series
- .value_counts() method, .apply() methods
- Data Cleaning - Dealing with Duplicates and Missing Values

Module 4 - Pandas (DataFrame)

- What is DataFrame and its use | Creating DataFrame
- DataFrame different functions
- Dropping columns/rows from DataFrame
- Display Particular Columns from DataFrame (Subset of DataFrame)
- Add New Column to DataFrame
- Broadcasting Operations in DataFrame | Dropping and Filling Null Values

Module 5 - DataFrame - Continued

- Different Sorting Algorithms in Dataframe
- Filtering Data in Dataframe
- Filterning Data based on Condition.
- Filter Data with AND & OR Operations
- .set_index() & .reset_index() in Pandas
- Retrieve Row Values Using loc and iloc in Pandas
- Set New/Multiple Values for a Specific Cell or Row
- Rename Index Labels or Columns in Pandas
- Delete Rows or Columns in Pandas
- The .nsmallest() and .nlargest(), .where(),.query(),.apply() methods in Pandas

Module 6 - Data Visualization

- Introduction to Data Visualization | Installing Matplotlib and Seaborn
- Line Plot, Scatter Plot, Bar Plot, Histogram, Pie Chart
- Box Plot
- Detecting Outliers
- Heatmap

Week 4 – Machine Learning

Module 1 – Introduction

- Introduction to Machine Learning
- Introduction to Data Science
- Data Science vs AI vs ML vs Deep Learning
- Flow of Machine Learning & its applications.

Module 1 – Machine Learning Types

- Types of Machine Learning
- Supervised Learning with Examples
- Unsupervised Learning with Examples
- Reinforcement Learning with Examples
- Regression vs Classification
- Different ML Algorithms

Module 2 - Simple Linear Regression

- Regression Problem Analysis
- Mathematical modelling of Regression Model
- Use cases, Regression Table,
- R-Square | Mean Squared Error
- Model Specification, Data sources for Linear regression.
- Project – Employee Salary Prediction / House Price Prediction

Module 3 - Logistic Regression and KNN

- Logistic Regression Working and Mathematical Equation
- Model Specification, Model Parameter Significance Evaluation, Confusion Matrix
- Different Classification Evaluation Metrics (Accuracy Score, Precision, Recall, F1-Score)
- Concept of KNN Model
- Project **–** IRIS Flower Classification / Titanic Passenger Survival Prediction

Module 4 – Unsupervised Learning - Clustering

- Unsupervised Learning, Clustering Introduction,
- K-Means Clustering, Handling K-Means Clustering,
- Maths behind K means Clustering – Centroids
- Hierarchical Clustering, Dendrogram
- Project – Customers Clustering

Module 5 – Natural Language Processing

- Introduction to NLP
- Concept of Stemming, Lemmatization
- Bag Of Words, TF-IDF
- Text Cleaning and Implementation on Python
- Sentiment Analysis
- Entity Recognition
- Examples

Module 6 – Azure Machine Learning

- Creating Regression model on Azure ML Studio
- Creating Classification Model on Azure ML Studio

Week 5 – Computer Vision & Image Processing

Module 1 - Introduction

- Introduction to Image Processing & Computer Vision
- Introduction to OpenCV Python
- Installing OpenCV-Python

Module 2 – Getting Started with Images

- Reading an Image with different modes
- Displaying an Image
- Writing an Image to different path
- Understanding Images as Matrices and numbers
- Image Shape & Dimension
- Size of image

Module 3 - Getting Started with Webcam & Videos

- Using Webcam | Webcam Resolution
- Capture Image Using Webcam
- Playing Video from file

Module 4 – Drawing Functions in OpenCV

- Creating an Image
- Drawing Line
- Drawing Rectangle
- Drawing Circle
- Drawing Ellipse
- Drawing Polygons
- Adding Text to Images

Module 5 - Basic Operations on Images

- Accessing and Modifying pixel values
- Accessing Image Properties
- Image ROI
- Changing Image Background
- Blurring | Image Smoothening
- Image Transition
- Image Sharpening
- Edge Detection

Module 6 - Introduction to Face/ Eyes/ Smile Detection

- HaarCascade Concept
- Detection of Eyes / Face / Smile from any Image
- Detection of Eyes / Face / Smile from Live Webcam
- Project – Face/ Smile/ Eyes Detection from Image and Webcam
- Car Detection

Module 7 - Facial Recognition Model

- Creating a Face Recognition Model
    - Capturing Samples
    - Training Model
    - Testing Model

Week 6 – Deep Learning

Module 1 - Introduction

- Introduction to Deep Learning
- Deep Learning vs Machine Learning
- Different techniques
- Installing Tensorflow | Keras

Module 2 - Introduction to Artificial Neural Network (ANN)

- Artificial Neural Networks (ANNs): Concept
- Activation Functions
- Feed Forward Neural Networks
- Back Propagation
- Cost Functions

Module 3 - Introduction to Convolutional Neural Network (CNN)

- Introduction to CNN
- Working of CNN
- Convolutional Layer | Pooling | Flatten

Module 4 - Introduction to Recurrent Neural Network (RNN)

- Introduction to RNN
- Introduction to LSTM
- RNN vs LSTM

Module 5 - Model Performance Metrics

- Confusion Matrix
- Precision Score | Recall Score | F1 – Score
- Overfitting and Underfitting
- Learning rate | Batch Size
- Feature Scaling
- Outliers

Projects

Random Password Generator	**Guess the Number Game**
Dice Roll Simulator	**Weather App**
Covid – 19 Data Analysis	**IPL Data Analysis**
Titanic Passenger Data Analysis	**Basic Website with Django**
Amazon/Flipkart Review Web Scraping	**Text Cleaning and Implementation Using NLP**
Review Sentiment Analysis	**House Price Prediction Project**
Titanic Passenger Survival Prediction Project	**Customer Clustering**
Image Resizer	**Facial Recognition Attendance System**
MNIST Handwritten Digit Prediction	**Google Stock Price Prediction**
Spam Email Detection	**Face / Smile / Eye Detection**
Car Detection	**Image Background Changer**