Machine Learning and Python

System and Information technology

Virtual

36 hours

EGP 15,000

Course Description:

The ultimate guide to career transformation—go from novice to professional! In this class, you will learn the different techniques of machine learning and how to apply the data science life cycle on data sets. You will also get the practical knowledge of implementing the most effective methods by yourself. Moreover, you will get both the theoretical underpinnings of learning along with the practical know-how needed to strongly apply these methodologies and techniques to new problems

Target Audience:

This course is designed for professionals and learners who want to build a strong foundation in data science and machine learning. It is ideal for individuals in fields such as business, economics, finance, engineering, and healthcare who wish to leverage data-driven decision-making. No prior experience in data science or programming is required.

Course Objective:

By the end of this course, participants will:

- Build essential statistical knowledge and learn how to apply it to solve different business questions using data-driven approaches.
- Analyze and visualize data efficiently using Python, gaining proficiency in using Python libraries like NumPy, Pandas, Matplotlib, and Seaborn for data analysis and visualization.
- Master the four crucial steps of any data analysis project: reading, describing, cleaning, and visualizing data, and use these techniques to extract meaningful insights.
- Work with the most popular tools in the industry that data analysts and scientists use daily, empowering participants to quickly analyze and visualize their data.
- Confidently extract knowledge and answers from data, applying advanced machine learning techniques and models to solve practical problems.
- Develop expertise in AI and machine learning tools, understanding their application and becoming proficient in the most widely used technologies in the field.
- Grasp the complete Data Science life cycle, from data collection and preparation to modeling, evaluation, and deployment, applying this knowledge to diverse datasets.
- Independently solve business problems by implementing machine learning algorithms such as regression, clustering, and classification, preparing participants to address real-world challenges as data scientists.
- Apply the entire data science life cycle on various real-world use cases, allowing participants to gain hands-on experience with end-to-end projects in multiple domains like fraud detection, customer segmentation, and predictive analysis

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Course Outline:

Module 1: Statistics, Linear Algebra & Probability for Machine Learning

- Descriptive Statistics
    1. Introduction
    2. Sampling Techniques
    3. Measures of Central Tendency
    4. Measures of Variability
    5. Skewness and Outliers
- Probability
    1. Introduction to Probability
    2. Probability Laws
    3. Bayesian Theorem
    4. Probability Distribution
    5. Gaussian Distribution
    6. Sampling Distribution
    7. Central Limit Theorem
- Normalization.
    1. Z-score
    2. Min-Max Method
    3. Decimal Scaling Method
- Inferential Statistics
    1. T-Test and ANOVA
    2. Chi-Square Test
    3. Spearman Correlation Coefficient
    4. Pearson Correlation Coefficient
    5. Regression Analysis
- Linear Algebra Review
    1. Review on Matrices
    2. Operations on Matrices
    3. Eigen Values and Eigen Vectors.
    4. Dimensionality Reduction (Principal Component Analysis - PCA)

Module 2: Machine Learning

- Introduction to Artificial Intelligence
- Introduction to Data Science
- Data Science life cycle.
- Introduction to Machine Learning & Data Mining
- Machine Learning
- Data Mining

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- Supervised and Unsupervised Learning
- Types of Data
- Data Preprocessing
- Regression for Data Science
    1. Linear Regression
    2. Polynomial Regression
- Bias and Variance
- Base Classifiers for Data Science
    1. Logistic Regression
    2. Decision Tree based Methods
    3. K-Nearest Neighbor
    4. Neural Networks
    5. Naïve Bayes
    6. Support Vector Machines
- Clustering
    1. K-mean Clustering
    2. Hierarchical Clustering
    3. Cluster Evaluation
- Evaluation of Learning Models for a Data Scientist
    1. F1-Score
    2. ROC
    3. Lift Curves

Module 3: Python for Machine Learning

- Python Basics
    1. General Syntax
    2. Data Types
- Python Data Structures
    1. Lists
    2. Tuples
    3. Sets
    4. Dictionaries
- Python Programming Fundamentals
    1. Functions
    2. Methods
    3. Loops
    4. Conditional Statements
    5. Classes and Objects

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- Data Science Libraries
    1. Numpy
    2. Pandas
    3. Matplotlib
    4. Seaborn
    5. Sklearn

Module 4: Class Projects

- Project 1: Automotive Price Prediction (Linear Regression Algorithim)
    1. Importing packages
    2. Loading the data
    3. Date Preprocessing
    4. Creating Linear Model
    5. Evaluating the Model
- Project 2: Fraud Detection (Logistic Regression Algorithm)
    1. Importing Packages
    2. Loading the Data
    3. Data Exploration
    4. Date Preprocessing
    5. Split the Data (train & Test)
    6. Train Logistic Regression Algorithm
    7. Test the Trained Model
    8. Evaluating the Model
- Project 3: Customer Churn Prediction (Neural Networks Algorithm)
    1. Importing Packages
    2. Loading the Data
    3. Date Preprocessing
    4. Split the Data (Train & Test)
    5. Train NN Algorithm.
    6. Test the trained Model
    7. Evaluating the Model
- Project 4: Customer Segmentation (K-Means Clustering)
    1. Importing Packages
    2. Loading the Data.
    3. Date Preprocessing
    4. Choose the Optimum Number of Clusters
    5. Apply K-Means
    6. Visualize the Output

Prerequisites:

None