

Data Science & Analytics

For finance - using python : 5 days

FA-0155 · 5 days

Software Development · Data & Analytics

Introduction

This is a bespoke comprehensive 5-day course on Python Programming for Data Science and Machine Learning, specifically tailored for professionals in the finance department.

In today's fast-evolving financial landscape, the ability to analyze data efficiently and use machine learning algorithms to predict future trends is invaluable. Python, with its simplicity and vast ecosystem of data science libraries, has become the lingua franca for data analytics and machine learning applications.

This course is designed to equip you with the essential Python programming skills, data manipulation and analysis techniques, visualization tools, and machine learning algorithms that are particularly beneficial in the finance industry.

By the end of this course, you'll have a solid foundation in Python programming and the practical skills to apply data science and machine learning techniques to solve real-world financial problems.

Learning outcomes

By the end of this course, participants will be able to:

- Understand the basics of Python programming and its application in data science and machine learning.
- Perform data manipulation and analysis using pandas and NumPy, focusing on financial datasets.
- Create a wide range of visualizations to represent financial data insights effectively.
- Apply basic machine learning techniques to predict market trends, detect anomalies, and make data-driven financial decisions.
- Implement specific machine learning algorithms, such as Naive Bayes, for anomaly detection in financial datasets.
- Develop a solid understanding of how data science and machine learning can be used to solve problems in the finance industry.

Prerequisites

- Basic understanding of finance and financial terminologies.
- No prior knowledge of programming is required.
- A willingness to learn and explore data science and machine learning concepts.

Training outline

1. Introduction to Python Programming

1. Using Python and setting up the development environment
2. Basic syntax and concepts: Variables, data types, operators
3. Control structures: if statements, loops
4. Functions: Definition, arguments, return values
5. Introduction to Python libraries: Why libraries, how to install and use them

2. Getting Started with Data Manipulation in Python

1. Introduction to pandas: Reading and writing data
2. DataFrames and Series: Basic operations, slicing, and indexing
3. Data cleaning: Handling missing values, data filtering, and manipulation
4. NumPy basics: Arrays, array operations, indexing, and slicing

3. Advanced Data Manipulation

1. Advanced pandas operations: GroupBy, merge, join operations
2. Time-series data in pandas: Date and time indexing, resampling, rolling operations
3. Handling large datasets: Chunking and efficient data processing

4. Data Visualization for Finance

1. Introduction to data visualization in Python
2. Using matplotlib: Basic plots, histograms, scatter plots
3. Advanced plotting with seaborn: Heatmaps, pair plots, and more complex data visualizations
4. Financial data visualization: Plotting stock market data, candlestick charts
5. Interactive visualizations with Plotly: Dashboards and interactive elements

5. Introduction to Machine Learning

1. Basic concepts of machine learning: Supervised vs. unsupervised learning, overfitting, underfitting
2. Preparing data for machine learning: Feature selection, normalization, and splitting data
3. Introduction to scikit-learn: Training a model, evaluating model performance

6. Applying Machine Learning in Finance

1. Predictive modeling: Linear regression, decision trees for predicting financial trends
2. Classification algorithms for credit scoring: Logistic regression, decision trees, random forests
3. Anomaly detection in financial transactions: Implementing Naive Bayes
4. Clustering for market segmentation: K-means, hierarchical clustering

7. Special Topics in Financial Data Analysis

1. Risk analysis: Monte Carlo or similar simulations, Value at Risk (VaR)
2. Portfolio optimization: Efficient frontier, Markowitz portfolio optimization
3. Algorithmic trading strategies: Moving averages, momentum strategies

8. Project and Case Studies

1. Working on a real-world financial data analysis project
2. Case studies

9. Wrapping Up and Next Steps

1. Review of key concepts and skills learned
2. Best practices for applying Python in finance
3. Resources and continuous learning tips

This outline is designed to start from the fundamentals of Python programming and gradually progress into more complex data manipulation, visualization, and machine learning techniques, all through the lens of financial applications.

The course emphasizes practical, hands-on learning with financial datasets to ensure that participants can apply the concepts and techniques in their professional work. The trainer may not be following the sequence of topics listed but rather use an iterative approach to training.