**Project Report: Analysing Risk Profiles of Apple and Tesla Stocks**

**Introduction**

In the dynamic world of stock markets, understanding the risk profiles of individual stocks is crucial for investors. This project focuses on analysing the risk profiles of two prominent stocks: Apple Inc. (AAPL) and Tesla Inc. (TSLA). By leveraging historical stock data and machine learning models, we aim to provide insights into the volatility and return patterns of these stocks, aiding investors in making informed decisions.

**Objective**

The primary objective of this project is to analyse and compare the risk profiles of Apple and Tesla stocks using historical data. We aim to predict future returns and volatility, identify key factors influencing these metrics, and provide actionable insights for investors.

**Goal**

The goal is to build robust machine learning models that can accurately predict the volatility and returns of Apple and Tesla stocks. By understanding the factors that drive these predictions, we can offer valuable insights into the risk characteristics of each stock.

**Insights**

* **Volatility Prediction:** Both Apple and Tesla models show high accuracy in predicting volatility, with R-squared scores above 0.94.
* **Feature Importance:** Lagged returns and technical indicators are significant predictors of volatility for both stocks.
* **Volatility Distribution:** Tesla exhibits a wider distribution of volatility compared to Apple, indicating a higher risk profile.
* **Model Performance:** The Apple model slightly outperforms the Tesla model in terms of accuracy, as indicated by lower MAPE and RMSE values.

**Explanation:**

* The "returns" column represents the daily percentage change in the closing price of the stock. It is calculated using the formula:

Returns = closet − closet−1 /closet−1

Were:

closet = the closing price at the current time period t

closet−1 = the closing price at the previous time period t – 1.

This formula calculates the percentage change between the closing price at time t and the closing price at time t−1.

It tells us how much the price has increased or decreased relative to the previous price.

The summary statistics provide insights into the average daily return, variability, and extreme values for both stocks.

The distribution plot shows the frequency of different return values, highlighting the volatility and risk associated with each stock.

**Deliverables**

* **Machine Learning Models:** Developed Random Forest Regression models for predicting stock returns and volatility.
* **Feature Importance Analysis:** Identified key features influencing volatility predictions.
* **Visualizations:** Provided plots for feature importance, predicted vs actual volatility, and volatility distributions.
* **Risk Metrics:** Calculated additional risk metrics such as MAPE and RMSE for model evaluation.

**Conclusion**

The analysis reveals that while both Apple and Tesla stocks can be predicted with similar accuracy, Tesla presents a higher risk profile due to its wider volatility distribution. Investors should consider these differences when making investment decisions based on their risk tolerance. The insights gained from this project can guide investors in understanding the risk dynamics of these stocks and making more informed investment choices.

**Additional Information**

* **Data Source:** Historical stock data for Apple and Tesla from 2014 to 2023.
* **Methodology:** Utilized Random Forest Regression models for prediction and analysis.
* **Tools Used:** Python, Pandas, Scikit-learn, Matplotlib, Seaborn.