DSCI 510: Final Project Proposal
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Analyzing Key Factors Influencing Volatility in Major Technology Stocks: AAPL, MSFT, NVDA, TSLA and AMZN

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Background

Technology stocks are highly volatile, but each company responds differently to market conditions, sentiment, and macroeconomic events. Investors often struggle to understand why some stocks (e.g., NVDA, TSLA) exhibit extreme price swings while others (e.g., MSFT, AAPL) remain more stable.

This project examines what factors drive volatility differences among major technology stocks and how these patterns evolve over time by analyzing long-term price data for Apple, Microsoft, NVIDIA, Tesla, and Amazon.

Data Collection Methodology

Data will be collected programmatically using Yahoo Finance, accessed through the yfinance Python library. This library allows automated extraction of historical market data .

For each stock, the project will collect daily closing prices, daily trading volume, and date-indexed historical data from 2021 to 2025. Data will be obtained programmatically using the yfinance Python library, which internally handles HTTP requests and parses JSON-like financial responses from Yahoo Finance. After retrieval, the data will be cleaned, aligned by date, and merged into a consistent DataFrame to prepare it for further analysis.

Analysis and Visualization Methodology

The analysis will include calculating daily returns for each stock, measuring rolling volatility using a 30-day rolling standard deviation, and comparing annualized volatility across the five companies. Correlation analysis will be used to examine relationships among the stocks, while additional evaluations will identify high-volatility periods and connect them to major market events. The project will also compare relatively stable stocks with higher-risk ones to highlight differences in behavior.

Visualization methods will include a multi-stock line chart of historical prices, rolling volatility plots over time, a correlation heatmap, distribution plots of daily returns to compare volatility, and bar charts summarizing average annualized volatility for each company.