

Final Project: COVID-19 and Its Effect on the Stock Market (30 Marks)

Overview

The goal of this project is to analyze the effects of COVID-19 on the global stock market using data-driven insights. You will create visualizations and reports that demonstrate trends and correlations between the pandemic and selected stock performances. This project requires you to apply concepts and skills learned during the course, including working with dataframes, APIs, time series data, and visualization techniques. You may collaborate in a group of up to three students.

Steps to Complete the Project

Step 1: Load COVID-19 Data

1. Read the daily confirmed cases and deaths into two dataframes using the provided URLs:
 - Confirmed cases data:
https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_confirmed_global.csv
 - Deaths data:
https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_deaths_global.csv
2. Use pandas to read and process these CSV files.

Step 2: Aggregate Global Data

- Create a dataframe that aggregates the total confirmed cases and deaths on a global level for each date.
- Convert the date columns into a proper datetime format for further analysis and visualization.

Step 3: Research and Select Stocks

Research a stock to represent each of the following industries, and document your choices:

- Overall American Market (e.g., S&P 500 ETF like SPY)
- Overall Canadian Market (e.g., TSX Composite ETF like XIU.TO)
- Travel Sector (e.g., airline or hotel company)
- Real Estate Sector (e.g., real estate investment trust or homebuilder)
- Precious Metals (e.g., gold or silver-related stocks like GLD or SLV)

Step 4: Fetch Stock Market Data

- Use AlphaVantage or another API/website to retrieve daily high and low prices for your selected stocks.
- Create a Python function to fetch and store this data in a new dataframe.

Step 5: Combine COVID-19 and Stock Market Data

- Append the stock market data to the COVID-19 aggregated dataframe.
- Align stock prices and COVID-19 data by date to allow for meaningful comparisons.

Step 6: Create Visualizations

Using Matplotlib (and optionally Seaborn or Plotly for advanced graphs), create the following visualizations:

1. Line Graphs:

- Show trends in global confirmed cases and deaths over time.
- Plot stock prices (high and low) over time for each selected stock.

2. Histograms:

- Display the distribution of daily changes in stock prices (e.g., daily highs minus daily lows).

3. Boxplots:

- Compare the variability of stock prices across the selected industries.

4. Scatter Plots:

- Create scatter plots to visualize potential correlations between global COVID-19 cases and stock prices for selected industries.

5. Bar Charts:

- Compare the average stock price movements during different phases of the pandemic (e.g., initial outbreak, peak, recovery).

6. Candlestick charts:

- show the daily price movement.

Step 7: Justify Your Visualizations

For each graph, write a brief explanation addressing:

- Why you chose the graph type.
- What insights the graph reveals.
- Any observed correlations or trends.

Additional Guidelines

1. Collaboration: Each group member should contribute meaningfully to the project. Specify each member's contributions in the submission.

Grading Rubric

Component	Marks	Criteria
Data Processing	12	Properly reads and aggregates confirmed cases and deaths data. Fetches and processes daily high and low prices for selected stocks. Combines COVID-19 and stock market data into a single data frame, etc.
Visualizations	10	Creates all required graphs with clear labels, legends, and visual clarity.
Explanation of Visualizations	3	Provides logical and insightful justifications for the chosen graph types and discusses observed trends and correlations.
Code Style and Readability	5	Code is well-organized, includes appropriate comments, and follows good coding practices.