

## Portfolio: Predictive Modeling in Stock Market Dynamics

### Introduction

This portfolio documents my journey through various tasks related to predictive modeling in stock market dynamics. The focus of the project is to leverage sentiment analysis and machine learning techniques to predict stock market trends. This compilation includes weekly tasks, each contributing to the development and understanding of different aspects of the project.

### Data Processing

#### DataProcessing1.ipynb

Summary: This notebook focuses on writing a function to load and process datasets with multiple features. It includes handling NaN values, different methods for splitting data into train/test sets, and the option to store data locally. The notebook also provides insights into Project P1's codebase.

Running Instructions:

1. Install required Python libraries: NumPy, Pandas, and any other libraries mentioned at the start of the notebook.
2. Open the notebook in a Jupyter environment.
3. Start by running the initial setup cells to import necessary libraries.
4. Carefully read the comments and descriptions in each cell. These provide context and explanations for the code.
5. Run the function definition cells to load and process the dataset.
6. Modify the parameters in the function calls to experiment with different datasets, date ranges, and processing options.
7. Execute the cells sequentially to understand how the data is being processed and stored.

#### DataProcessing2.ipynb

Summary: This notebook is dedicated to visualizing stock market data. It includes functions to display data using candlestick and boxplot charts, useful for understanding stock market trends over specific time frames.

Running Instructions:

1. Install mplfinance library using pip or conda if not already installed. Also, ensure matplotlib and pandas are installed.
2. Open the notebook in your Jupyter environment.
3. Run the initial cells to import necessary libraries and set up the environment.
4. Follow the code and comments to understand how financial data is fetched and pre-processed.
5. Execute the function definition cells for candlestick and boxplot charts.
6. Modify parameters in the visualization functions, such as the stock ticker, date range, and

window size, to explore different visualization options.

7. Run the cells to generate and view the charts.

## Machine Learning

### MachineLearning1.ipynb

Summary: This notebook begins the exploration of machine learning models. It sets up the computational environment and introduces initial models for stock price prediction.

Running Instructions:

1. Ensure you have TensorFlow, Scikit-Learn, and other necessary machine learning libraries installed.
2. If using a local machine, make sure your GPU drivers are up-to-date for TensorFlow to utilize GPU acceleration.
3. Open the notebook in a Jupyter environment.
4. Start by running the setup cells to check for GPU availability and import required libraries.
5. Proceed through the notebook, paying close attention to comments and explanations.
6. Run the cells that introduce and configure the initial machine learning models.
7. Execute the model training and evaluation cells. Observe the output and performance metrics.

### MachineLearning2.ipynb

Summary: A continuation of machine learning exploration, this notebook delves deeper into model training and evaluation.

Running Instructions:

1. Confirm the availability of a GPU for computation-intensive tasks. Update GPU drivers if necessary.
2. Open the notebook in your Jupyter environment.
3. Run the setup cells to import necessary libraries and check for GPU availability.
4. Carefully read through the notebook to understand the context and objectives of each section.
5. Execute cells that train different machine learning models. Adjust model parameters as needed.
6. Analyze the results, performance metrics, and visualizations provided in the notebook.

### MachineLearning3.ipynb

Summary: This notebook focuses on advanced aspects of machine learning, including fine-tuning models and integrating sentiment analysis for predictions.

Running Instructions:

1. Install mplfinance for financial data visualization if not already installed. Also, ensure you have TensorFlow and other necessary libraries.
2. Open the notebook in a Jupyter environment.

3. Run the initial cells to set up the environment, check for GPU availability, and import required libraries.
4. Follow the notebook, running cells sequentially to fine-tune machine learning models.
5. Pay special attention to the sections integrating sentiment analysis. Understand how the sentiment data is being incorporated into the models.
6. Execute the cells for model evaluation and observe how the combined models perform.

### Conclusion and Reflections

This portfolio encapsulates my journey through data processing and machine learning tasks aimed at predicting stock market trends. Each notebook contributed to my understanding and skills in handling financial data, sentiment analysis, and predictive modeling. The project not only enhanced my technical capabilities but also provided valuable insights into the dynamic nature of the stock market.

### Additional Notes

- Ensure you have a stable internet connection for downloading datasets.
- Some notebooks may require significant computational resources; consider running them on a machine with sufficient capabilities.
- - Install mplfinance for financial data visualization if not already installed. Also, ensure you have TensorFlow and other necessary libraries.
- - Open the notebook in a Jupyter environment.
- - Run the initial cells to set up the environment, check for GPU availability, and import required libraries.
- - Follow the notebook, running cells sequentially to fine-tune machine learning models.
- - Pay special attention to the sections integrating sentiment analysis. Understand how the sentiment data is being incorporated into the models.
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