

Stox Watch



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Problem Statement



- Investors struggle to effectively invest due to volatility and complexities within the stock market
- Traditional methods don't allow for personalization of risk parameters
- Difficult to consider all variables without a model
 - Budget constraints
 - Diversification
 - Risk factor
- There is a need for real-time insights and recommendations

Why a DSS?

- Need to accurately evaluate multiple alternatives
- Requires the ability to forecast stock prices
- Must account for market volatility
- Use historical data to improve decisions
- Data-driven model for insights



Nature of Data



Market

- Data related to price (opening and closing), volume and earning projections
- Anything that can be measured by a financial instrument



Fundamental

- Data from income statements, balance sheets and cash flows
- Broader economic indicators to establish company's intrinsic value



Alternative

- Sentiment data: outlook of investors towards a particular security
- Data indirectly linked to company performance

Data Processes

Sources

Open-source APIs allow for flexibility to customize requests and fields



yahoo!
finance



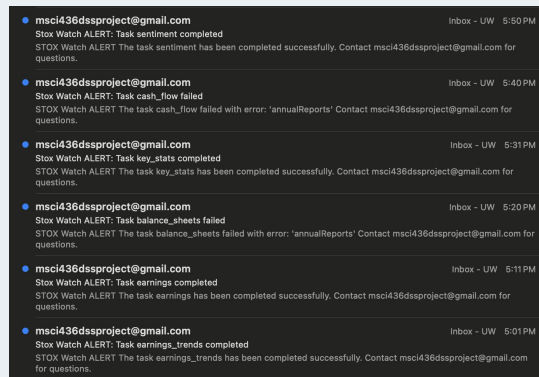
Processing

Used batch processing to store data for Online Analytical Processing (OLAP)



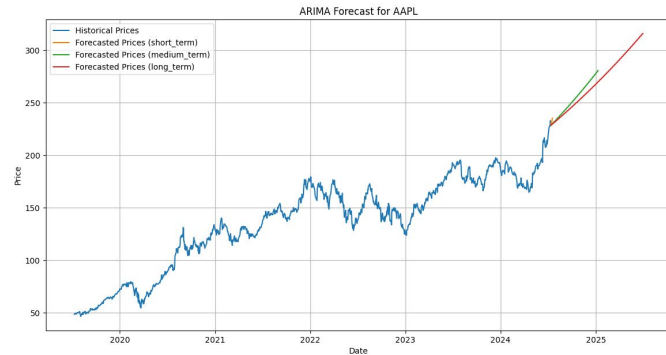
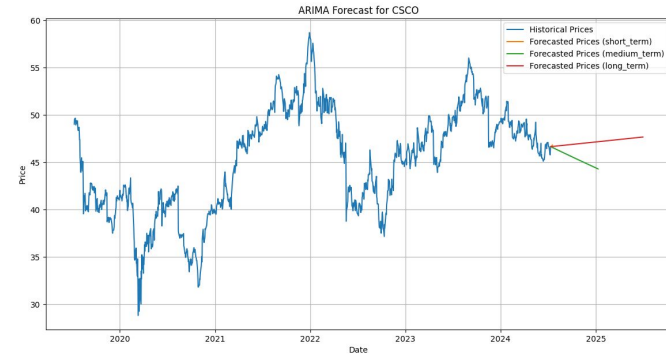
Orchestration

Orchestrate scripts in charge of processing data from different sources to run on server



Forecasting Model

- Leveraged an ARIMA model due to its comprehensive approach
 - Autoregression (AR)
 - Integration (I)
 - Moving average (MA)
- Forecasted for short term (5 days), medium term (4 months) and long term (1 year)
- Adjusted P, D and Q values for the best fit for each security
 - P: Autoregressive order
 - D: Differencing order
 - Q: Moving average order

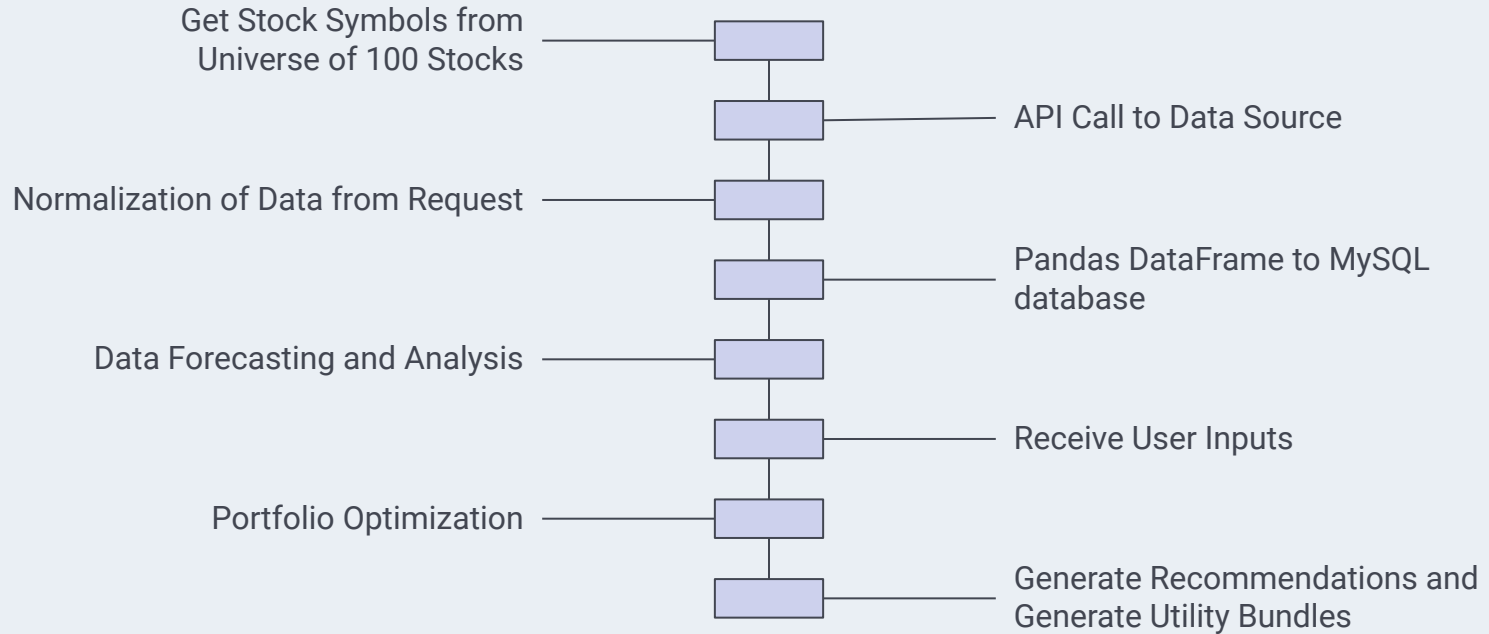


Portfolio Optimization Model

- **Goal:** Maximize profitability given a series of risk-averse constraints.
- **Predefined parameters:** maximum allowable percentage of budget invested into a single stock, lamda risk percentage, minimum number of unique industries to invest in, minimum number of shares to buy from each company.
 - Simplified into three buckets for low, medium and high risk portfolios
- **User inputted parameters:** budget and stock return forecast to utilize.

$$\text{maximize } Z = \sum_i (1 + r_i)(x_i)(p_i) - \lambda \sum_i \sum_j x_i x_j \sigma_{ij}$$

Data Pipeline





Demo

Infrastructure



AP Scheduler - Schedules and Orchestrates Jobs

An AP Scheduler instance deployed on an AWS EC2 instance is utilized too.

AWS RDS - Warehouses Data

The data is normalized into tabular format and ingested to the MySQL data warehouse.



amazon
RDS





Streamlit

Streamlit - Visualizes and Interfaces Data

A user interface is presented to the user to visualize data for readability and analysis.

Monitoring

Stox Watch ALERT: Task earnings_trends completed

 msci436dssproject@gmail.com <msci436dssproject@gmail.com>
To:  Rodrigo Tiscareno



Today at 5:01 PM

STOX Watch ALERT

The task earnings_trends has been completed successfully.

Contact msci436dssproject@gmail.com for questions.

Stox Watch ALERT: Task income_statements failed

 msci436dssproject@gmail.com <msci436dssproject@gmail.com>
To:  Rodrigo Tiscareno

Today at 4:50 PM

STOX Watch ALERT

The task income_statements failed with error: 'annualReports'

Contact msci436dssproject@gmail.com for questions.

Logging

Monitoring

View the last two pipeline runs and filter by status.

Filter by Pipeline Status

All

All Pipeline Processes

FINISH: Completed sentiment pipeline @ 2024-07-11 21:50:17

FETCHING: Running sentiment pipeline @ 2024-07-11 21:50:00

START: Starting sentiment pipeline @ 2024-07-11 21:50:00

ERROR: Failed cash_flow with error: 'annualReports' pipeline @ 2024-07-11 21:40:08

FETCHING: Running cash_flow pipeline @ 2024-07-11 21:40:00

START: Starting cash_flow pipeline @ 2024-07-11 21:40:00

FINISH: Completed key_stats pipeline @ 2024-07-11 21:31:09

FETCHING: Running key_stats pipeline @ 2024-07-11 21:30:01

START: Starting key_stats pipeline @ 2024-07-11 21:30:00

ERROR: Failed balance_sheets with error: 'annualReports' pipeline @ 2024-07-11 21:20:09

Resources

Github: https://github.com/rodrigotiscareno/stox_watch

References

CFI. (2024, May 23). *Market sentiment*. Corporate Finance Institute.

<https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/market-sentiment/#:~:text=overall%20financial%20market-,What%20is%20Market%20Sentiment%3F,in%20the%20overall%20price%20trends>

Whitby, J. (2022, September 14). *The illusion of diversification: The myth of the 30 stock portfolio*. The Illusion of Diversification: The Myth of the 30 Stock Portfolio. <https://www.investopedia.com/articles/stocks/11/illusion-of-diversification.asp>

Alfares, H., & Al-Marhoun, M. (2020). Stock Market Portfolio Selection by Linear Programming.