

GMF Investments Portfolio Forecasting

Overview

This project leverages time series forecasting models to enhance portfolio management strategies for **Guide Me in Finance (GMF) Investments**. Using historical data for key financial assets—Tesla (TSLA), Vanguard Total Bond Market ETF (BND), and S&P 500 ETF (SPY)—we aim to forecast market trends, optimize asset allocation, and manage risk. By incorporating ARIMA, SARIMA, and LSTM models, this project enables GMF Investments to offer clients data-driven investment recommendations.

Project Goals

- **Market Trend Forecasting:** Predict future market trends for TSLA, BND, and SPY to anticipate asset performance.
- **Portfolio Optimization:** Use forecasted insights to optimize portfolio allocation, balancing high returns with risk management.
- **Risk Management:** Adjust portfolio strategy based on predicted volatility and market trends to minimize client exposure to risks.

Data Sources

Data is sourced using the [YFinance](#) library, covering:

- **Tesla (TSLA):** High-growth, high-volatility stock in the automotive sector.
- **Vanguard Total Bond Market ETF (BND):** A bond ETF for stability and income.
- **S&P 500 ETF (SPY):** An ETF representing U.S. market exposure.

Historical data includes Open, High, Low, Close, Volume, and Adjusted Close prices from **January 1, 2015, to December 31, 2024**.

Technologies Used

- **Programming Language:** Python
- **Data Collection:** YFinance API
- **Time Series Models:** ARIMA, SARIMA, LSTM (Long Short-Term Memory)
- **Libraries:** `pandas`, `numpy`, `statsmodels`, `tensorflow`, `scikit-learn`

Project Structure

- **/docs:** Documentation on methodology, model descriptions, and portfolio optimization.
- **/notebooks:** Jupyter notebooks for data exploration, model development, and portfolio optimization.
- **requirements.txt:** List of dependencies needed to run the project.
- **LICENSE.md:** Licensing information for open-source distribution.

Getting Started

Installation

1. Clone the repository:

```
git clone https://github.com/epythonlab/gmf-investments-portfolio-forecasting.git
cd gmf-investments-portfolio-forecasting
```

2. Install dependencies:

Ensure you have Python 3.7+ installed, then install the required libraries:

```
pip install -r requirements.txt
```

Data Collection

Use the **YFinance** library to collect historical financial data. To fetch data for each asset, use the following example for **Tesla (TSLA)**:

```
import yfinance as yf

# Download data for Tesla
tsla_data = yf.download("TSLA", start="2015-01-01", end="2024-12-31")
```

Usage

1. Run Jupyter Notebooks:

- **Data Exploration:** Analyze trends and preprocess data.
- **Modeling Notebooks:** ARIMA, SARIMA, and LSTM models for forecasting asset prices.
- **Portfolio Optimization:** Adjust portfolio allocation based on forecasting results.

2. Portfolio Optimization:

- Utilize forecasted trends to balance the portfolio with high-growth, stable, and diversified assets.
- Visualize asset allocation to see how each asset contributes to the portfolio's risk-return profile.

Methodology

Data Preprocessing

- Clean and preprocess data by removing missing values and handling anomalies.
- Analyze volatility and trends for each asset to inform model choice and calibration.

Model Development

- **ARIMA & SARIMA:** Traditional time series models for initial trend analysis and baseline comparison.
- **LSTM:** Deep learning model for capturing non-linear patterns and dependencies, particularly effective for high-volatility assets.

Evaluation Metrics

- **Root Mean Square Error (RMSE)**
- **Mean Absolute Error (MAE)**

Use these metrics to assess and compare model performance, refining them based on results.

Contributing

You are welcome to contributions to enhance this project! Please read our [CONTRIBUTING.md](#) for details on our code of conduct and submission guidelines.

Steps to Contribute:

1. Fork the repository.
2. Create a feature branch (`git checkout -b feature-name`).
3. Commit your changes (`git commit -m 'Add new feature'`).
4. Push to the branch (`git push origin feature-name`).
5. Create a Pull Request.

License

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