Stock Price Analysis

Objective

The project investigates stock price trends and develops predictive models to forecast future stock prices. The analysis focuses on identifying patterns in stock market data and evaluating the performance of predictive algorithms.

Key Insights

1. Data Preprocessing

- **Data Cleaning**: Missing values and anomalies were handled to ensure a clean dataset for analysis.
- **Feature Engineering**: Extracted features such as moving averages, price volatility, and trading volume trends to enhance model performance.

2. Stock Trends

- Visualized historical stock prices to identify patterns such as uptrends, downtrends, and consolidations.
- Examined correlations between trading volume and stock price movements.

3. Predictive Models

- **Linear Regression**: Achieved a baseline R-squared value of approximately 0.70, indicating a moderate fit.
- **Advanced Models**: Explored other machine learning techniques such as Random Forest and Gradient Boosting, improving the R-squared value to 0.85.

4. Model Evaluation

- **Metrics**: Evaluated models using Mean Squared Error (MSE) and R-squared. The best model reduced the MSE significantly compared to the baseline.

Visualizations & Data Insights

Key Charts

- **Stock Price Trends**: Line graphs depicting stock price movements over time.
- **Feature Analysis**: Scatter plots and correlation heatmaps to show relationships between variables.

- **Predicted vs. Actual**: Comparison of predicted stock prices with actual prices to visualize model accuracy.

Recommendations

1. **Enhance Feature Set**:
    - Incorporate macroeconomic indicators such as interest rates, inflation, and market indices to improve predictive accuracy.
2. **Regular Updates**:
    - Update the model regularly with new stock data to ensure relevance and accuracy.
3. **Deploy Predictive Models**:
    - Implement the best-performing model in a production environment for real-time stock price forecasting.
4. **User-Friendly Dashboard**:
    - Create an interactive dashboard for visualizing stock trends and predictions to aid decision-making.
