AI-Investment-ChatBot-SOC-2024
Task 1

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Summary and Findings

1. Data Collection and Preparation

- Data Source: Historical stock price data was collected from the Nifty 50 index using the `yfinance` library.
- Date Range: Data spanning a specified date range was used for analysis.
- Preprocessing: The data was split into training, validation, and test sets. Missing values were handled, and normalization was applied where necessary to ensure consistent scaling across models.

2. Model Implementation and Evaluation

1. ARIMA Model
   - Performance:
     - RMSE: 5050.52
     - MAE: 5029.46
   - Insights: ARIMA provides a baseline model with moderate accuracy. It captures linear dependencies but may struggle with capturing seasonality or non-linear trends.

2. SARIMA Model
   - Performance:
     - RMSE: 4636.18
     - MAE: 4613.40
   - Insights: SARIMA improves upon ARIMA by accounting for seasonal components. It performs better in capturing periodic fluctuations in the data.

3. Exponential Smoothing Model
   - Performance:
     - RMSE: 2503.63
     - MAE: 2235.47
   - Insights: Exponential smoothing shows significantly improved performance compared to both ARIMA and SARIMA. It excels in capturing short-term fluctuations and trend changes in the data.

3. Model Comparison and Evaluation

- Visualization: Line plots were used to visualize actual vs predicted values for each model, highlighting how well each model forecasts the stock prices over time.

- Metrics: RMSE and MAE were calculated to quantify the accuracy of each model. Exponential smoothing demonstrated the lowest error metrics, indicating superior forecasting accuracy compared to ARIMA and SARIMA.

Conclusion

- Based on the analysis, exponential smoothing emerges as the preferred model for forecasting Nifty 50 stock prices within the specified time frame. Its ability to adapt quickly to changing trends and short-term fluctuations makes it particularly suitable for financial forecasting tasks.