ForecastX: Time Series Stock Analysis & Prediction

Guided by: Dr. Monika Bhattacharjee

Name: kunjbihari
Roll. : 24n0081

Overview

- Interactive dashboard built with Streamlit
- Uses ARIMA & SARIMA for stock forecasting
- Manual and automated hyperparameter tuning
- Empowers traders with clear, actionable insights

Stock Analysis Module (Features)

- Enter any stock ticker and date range
- Company profile: sector, employees, website
- Financial metrics & ratios (Market Cap, EPS, PE, etc.)
- Visualizations: Candlestick chart, MACD, RSI, Bollinger Bands
- Historical price data table

Prediction Module (Workflow)

- Choose ARIMA or SARIMA model
- Configure rolling mean, training years, model parameters
- Manual parameter input or Grid Search hyperparameter tuning
- Fetch and preprocess data with rolling mean smoothing
- Model trained on historical data, validated with last 30 days

Model Validation and Metrics

- Validation period: 30 business days held out
- Metrics shown: MSE, RMSE, MAE, MAPE
- Analytics: Latest close price, historical mean, volatility
- Example: AAPL SARIMA Grid Search results
    - RMSE: 15.28
    - MAPE: 4.7%
    - MSE: 115.42
    - MAE:9.84

Forecast Output

- Holdout period forecast with confidence intervals
- Next 30 days forecast with lower and upper bounds
- Downloadable CSVs for validation and forecast data
- Combined plot of actual, validation, and forecasted prices

Technical Summary

Aspect	ARIMA	SARIMA
Use	Non-seasonal univariate data	Seasonal data with period (s)
Paramete	(p, d, q)	(p, d, q)(P, D, Q, s)
Fitting	Rolling mean smoothing	Same with seasonal parameters
Tuning	Manual or Grid Search	Manual or Grid Search

Insights and Recommendations

- SARIMA effective for seasonal stocks; ARIMA simpler for others
- Grid search tuning recommended for best accuracy
- Visualize validation metrics for model confidence
- Explore technical indicators for trading signals

Conclusion

- ForecastX provides a comprehensive ARIMA/SARIMA forecasting toolkit
- Combines robust analytics and user-friendly design
- Supports manual expertise and automated optimization
- Enhances trader decision-making with transparent, validated forecasts

Appendix

Hypertuning for ARIMA

Column1	order	mse	rmse	mae	mape	seasonal_order	Column2
0	0,0,0	522.7010447	22.86265612	22.41442123	10.69759935		
1	0,0,1	517.4010883	22.74645221	22.11567498	10.54655613		
2	0,0,2	514.3098477	22.67840047	21.94463509	10.46112185		
3	0,1,0	115.4286904	10.74377449	9.840626308	4.672028229		
4	0,1,1	136.3958586	11.67886375	10.77502171	5.117791245		
5	0,1,2	149.6427347	12.23285473	11.34068663	5.388104081		
6	1,0,0	125.2454567	11.19131166	10.25235481	4.867544798		
7	1,0,1	145.9458762	12.08080611	11.14577777	5.29388927		
8	1,0,2	162.0505218	12.72990659	11.79847264	5.605515966		
9	1,1,0	264.8130249	16.27307669	15.29075667	7.271701494		
10	1,1,1	244.8521976	15.64775376	14.72602186	7.003897195		
11	1,1,2	230.5353621	15.183391	14.27594207	6.789376141		
12	2,0,0	305.9913888	17.49260955	16.4146753	7.805416016		
13	2,0,1	288.7002212	16.99118069	15.96304828	7.59127571		
14	2,0,2	264.1798963	16.25361179	15.26352521	7.258392901		
15	2,1,0	229.3538464	15.14443285	14.2454857	6.775092104		
16	2,1,1	176.0072003	13.26677053	12.4337358	5.911845914		
17	2,1,2	175.5284412	13.2487147	12.41166818	5.901177717		

Thank you Ma’am