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Conclusion

Stocks	Accuracy	Precision	Recall	F1 Score	Direction	Best Algo.
AEFES	0.6	0.61	0.68	0.64	-1	CatBoost
AGHOL	0.61	0.61	0.75	0.76	1	LSTM
AKBNK	0.61	0.61	0.65	0.63	-1	CatBoost
AKFGY	0.71	0.72	0.72	0.72	1	Random Forest
AKSA	0.7	0.69	0.71	0.7	-1	Random Forest
AKSEN	0.73	0.71	0.73	0.72	-1	Random Forest
ALARK	0.65	0.67	0.57	0.61	1	LightGBM
ALBRK	0.79	0.76	0.81	0.78	1	Random Forest
ALGYO	0.51	0.51	0.74	0.68	1	LSTM
ALKIM	0.75	0.74	0.77	0.76	1	Random Forest
ARCLK	0.78	0.77	0.78	0.77	-1	Random Forest
ASELS	0.79	0.77	0.81	0.79	-1	Random Forest
AYDEM	0.64	0.65	0.62	0.64	-1	CatBoost
BAGFS	0.64	0.63	0.69	0.66	1	CatBoost
BERA	0.52	0.52	0.93	0.69	1	LSTM
BIMAS	0.61	0.62	0.74	0.67	-1	CatBoost
BRYAT	0.78	0.75	0.83	0.79	1	Random Forest
BUCIM	0.66	0.63	0.68	0.66	1	CatBoost
CCOLA	0.62	0.65	0.68	0.66	-1	CatBoost
CEMTS	0.79	0.78	0.8	0.79	1	Random Forest
CIMSA	0.65	0.64	0.59	0.61	1	LightGBM
DEVA	0.77	0.76	0.83	0.79	1	Random Forest
DOAS	0.77	0.75	0.79	0.77	1	Random Forest
DOHOL	0.62	0.63	0.63	0.63	1	LightGBM
ECILC	0.66	0.69	0.64	0.67	1	LightGBM
EGEEN	0.75	0.75	0.79	0.77	-1	Random Forest
EKGYO	0.75	0.71	0.78	0.74	-1	Random Forest
ENJSA	0.62	0.64	0.59	0.61	1	LightGBM
ENKAI	0.62	0.66	0.64	0.65	-1	CatBoost
ERBOS	0.81	0.78	0.82	0.8	1	Random Forest
EREGL	0.72	0.7	0.7	0.7	-1	Random Forest
FROTO	0.78	0.75	0.8	0.77	1	Random Forest
GARAN	0.77	0.75	0.81	0.78	-1	Random Forest
GENIL	0.69	0.69	0.62	0.65	1	LightGBM
GESAN	0.66	0.65	0.61	0.63	1	LightGBM
GLYHO	0.76	0.75	0.8	0.77	1	Random Forest
GOZDE	0.84	0.82	0.88	0.85	1	Random Forest
GSDHO	0.64	0.61	0.61	0.61	1	LightGBM

GUBRF	0.63	0.63	0.6	0.61	1	LightGBM
GWIND	0.74	0.74	0.73	0.73	1	Random Forest
HALKB	0.74	0.74	0.73	0.73	-1	Random Forest
HEKTS	0.79	0.78	0.77	0.77	1	Random Forest
IPEKE	0.64	0.67	0.57	0.62	1	LightGBM
ISCTR	0.74	0.76	0.78	0.77	-1	Random Forest
ISDMR	0.76	0.72	0.75	0.73	1	Random Forest
ISFIN	0.65	0.67	0.64	0.66	-1	LightGBM
ISGYO	0.64	0.71	0.6	0.65	1	LightGBM
ISMEN	0.77	0.74	0.84	0.78	1	Random Forest
JANTS	0.74	0.73	0.74	0.74	-1	Random Forest
KARSN	0.77	0.77	0.78	0.78	-1	Random Forest
KARTN	0.73	0.71	0.77	0.74	1	Random Forest
KCHOL	0.76	0.74	0.8	0.77	1	Random Forest
KONTR	0.64	0.64	0.6	0.62	1	LightGBM
KORDS	0.76	0.75	0.75	0.75	-1	Random Forest
KOZAA	0.63	0.65	0.58	0.61	1	LightGBM
KOZAL	0.75	0.73	0.76	0.75	1	Random Forest
KRDMD	0.76	0.73	0.76	0.74	1	Random Forest
LOGO	0.77	0.77	0.8	0.79	1	Random Forest
MAVI	0.59	0.6	0.67	0.63	-1	CatBoost
MGROS	0.59	0.65	0.7	0.67	1	CatBoost
NTHOL	0.61	0.61	0.66	0.64	1	CatBoost
NUGYO	0.76	0.74	0.77	0.76	-1	Random Forest
ODAS	0.77	0.75	0.78	0.76	1	Random Forest
OTKAR	0.73	0.75	0.78	0.76	-1	Random Forest
OYAKC	0.77	0.75	0.79	0.77	1	Random Forest
PETKM	0.64	0.62	0.68	0.65	1	CatBoost
PGSUS	0.62	0.62	0.64	0.63	1	CatBoost
PRKAB	0.78	0.78	0.77	0.77	-1	Random Forest
PSGYO	0.81	0.8	0.61	0.69	1	CatBoost
QUAGR	0.77	0.76	0.79	0.78	1	Random Forest
SAHOL	0.55	0.55	1	0.71	-1	LSTM
SASA	0.74	0.68	0.71	0.69	1	Random Forest
SELEC	0.74	0.73	0.75	0.74	1	Random Forest
SISE	0.55	0.51	0.93	0.66	1	LSTM
SKBNK	0.74	0.64	0.71	0.78	1	LSTM
SMRTG	0.77	0.74	0.77	0.75	1	Random Forest
SNGYO	0.74	0.74	0.76	0.75	-1	Random Forest
SOKM	0.62	0.67	0.58	0.62	1	LightGBM
TAVHL	0.79	0.77	0.82	0.79	1	Random Forest
TCELL	0.77	0.76	0.81	0.79	-1	Random Forest
THYAO	0.78	0.76	0.8	0.78	1	Random Forest
TKFEN	0.55	0.58	0.9	0.7	-1	LSTM
TMSN	0.47	0.47	0.81	0.3	1	LSTM
TOASO	0.52	0.52	0.93	0.69	1	LSTM

TRGYO	**0.68**	**0.66**	**0.71**	**0.69**	**-1**	**CatBoost**
TSKB	**0.64**	**0.65**	**0.61**	**0.63**	**-1**	**LightGBM**
TSPOR	**0.76**	**0.7**	**0.79**	**0.75**	**1**	**Random Forest**
TTKOM	**0.77**	**0.74**	**0.8**	**0.78**	**-1**	**Random Forest**
TTRAK	**0.63**	**0.69**	**0.58**	**0.63**	**1**	**LightGBM**
TUKAS	**0.79**	**0.8**	**0.75**	**0.77**	**-1**	**Random Forest**
TUPRS	**0.62**	**0.62**	**0.62**	**0.62**	**1**	**LightGBM**
TURSG	**0.67**	**0.77**	**0.53**	**0.63**	**1**	**LightGBM**
ULKER	**0.61**	**0.62**	**0.68**	**0.65**	**-1**	**CatBoost**
VAKBN	**0.77**	**0.74**	**0.8**	**0.77**	**1**	**Random Forest**
VESBE	**0.64**	**0.62**	**0.66**	**0.64**	**-1**	**CatBoost**
VESTL	**0.78**	**0.72**	**0.76**	**0.74**	**1**	**Random Forest**
YATAS	**0.65**	**0.63**	**0.66**	**0.65**	**1**	**CatBoost**
YKBNK	**0.62**	**0.63**	**0.72**	**0.67**	**-1**	**CatBoost**
YYLGD	**0.79**	**0.77**	**0.77**	**0.77**	**1**	**Random Forest**

First of all, I filled the selected data in Borsa Istanbul into an array. I placed the open, close, low, high data of each stock from January 2023 until today in a dataframe. Then I showed the candlestick graph of all stocks. To define indicators for all stocks. I defined the indicators I determined mathematically. The indicators I defined:

- EMA5
- EMA13
- SMA50
- ADX
- RSI
- Bollinger
- Ichimoku

Then, I showed the indicator values of all stocks in the form of a dataframe.

I coded the functions of Random Forest, LightGBM, CatBoost machine learning algorithms. I made each of them two different ways to examine the workings of each in detail. In the first one, I used only open, close, high, low data. In the other one, I used the indicators I mentioned above. In each case, I used 80 percent of the data for training and 20 percent for testing. I used the other variables that other developers use in their stock algorithms.

Let's examine it separately:

- A Random Forest Regressor model is created using the RandomForestRegressor class. This model contains 100 trees and the random_state parameter is used for randomness.

- A LightGBM Regressor model is created using the lgb.LGBMRegressor class. The hyperparameters of the model (such as n_estimators, max_depth, learning_rate) are determined.
- A CatBoost Regressor model is created using the CatBoostRegressor class. The hyperparameters of the model (such as iterations, depth, learning_rate) are determined.
- The data is brought to the appropriate format for the LSTM model.
- A custom LSTM model called StockLSTM is defined and trained on the training data.
- The model is trained on all the training set
- The trained model makes predictions on all the test set
- Mean square error (MSE) is calculated as a measure of error between actual and estimated values of each of algorithms.

I used the stocks I held in the array in all of these algorithms. Then, I kept the accuracy, precision, recall, f1 score, direction values for each stock in a csv file.

After making a few changes to the LSTM algorithm I used previously, I exported its values to a csv file.

Finally, by comparing the values of each algorithm, I created the final table by adding the algorithm of the F1 score with the highest score for each stock as a column. Then, I selected 10 stocks by comparing my own observations with other algorithms.

NOTE: These stocks were selected on December 23rd for December 24th.

The selected stocks are as follows:

STOCKS	**DIRECTIONS**
GOZDE	1
PSGYO	1
BIMAS	-1
MGROS	1
DOHOL	1
CCOLA	-1
GUBRF	1
ALARK	1
AKBNK	-1
NTHOL	1