FORECASTING BANKING STOCK PRICES IN INDONESIA USING MACHINE LEARNING MODELING

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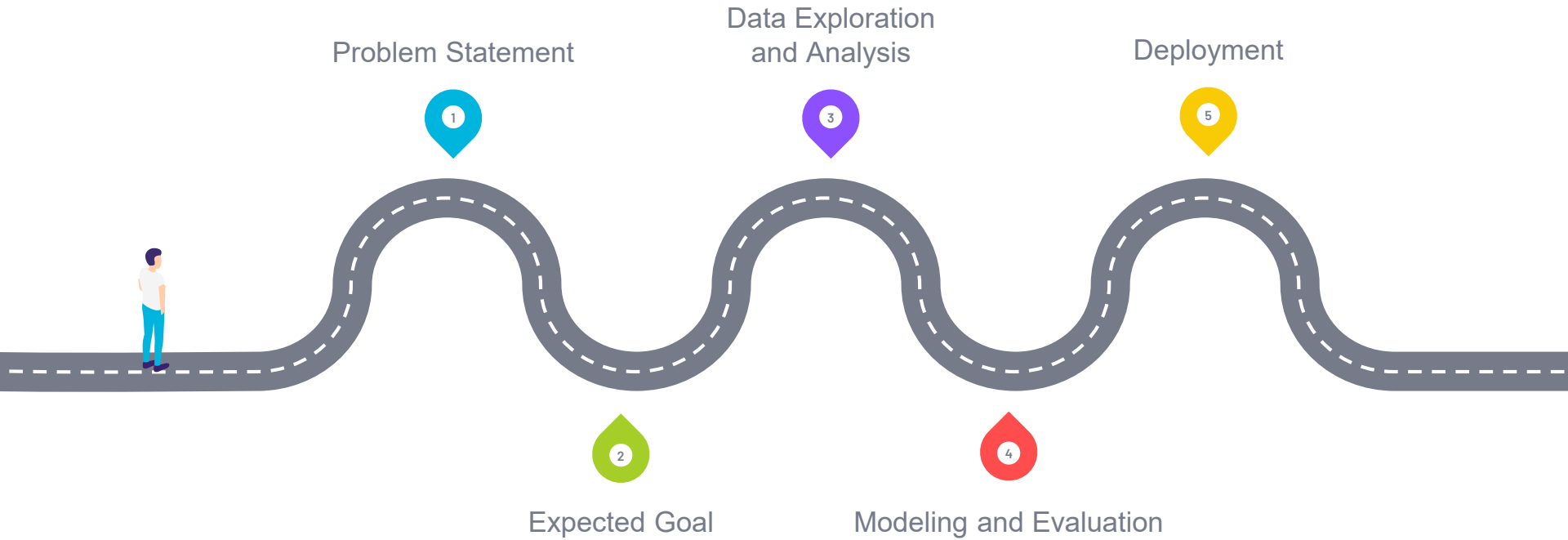
Roadmap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1

Problem Statement

Why do we need machine learning in stock price valuation?

Predicting Stock Prices

Two approach in predicting stock prices:

Fundamental Analysis

Predicting stock prices based on the company's financial statement

Technical Analysis

Predicting stock prices based on its charts and patterns

Machine Learning Algorithm

- Another approach to predicting stock prices
- Improove pattern incosistency

2

Expected Goal

How can machine learning help us?

We want to predict possible stock prices outcomes or expected trends by fitting its historical data to machine learning algorithms

This approach will be beneficial for:

- Private Trader
- Investor
- Fund Managers
- Financial Advisors
- Securities
- etc.

3

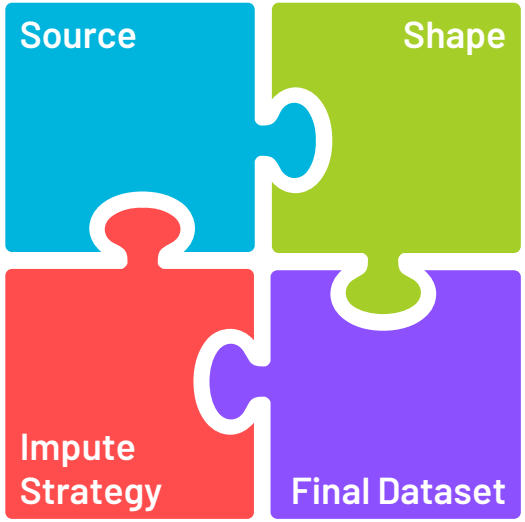
Data Exploration and Analysis

What insights can we get from data?

Datasets Summary

Stock price historical data from Neo HOTS (Mirae Asset Security Application)

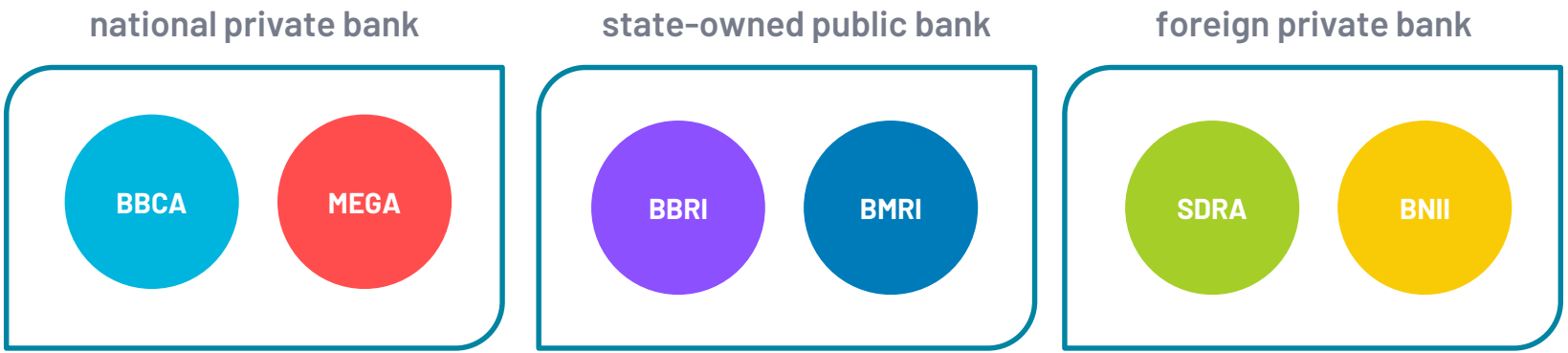
Missing value are filled using backfill method



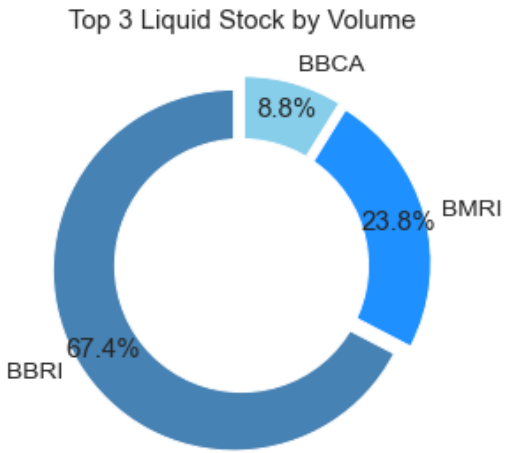
Compiled data of 7266 rows and 11 features in total which will be grouped to 6 smaller datasets

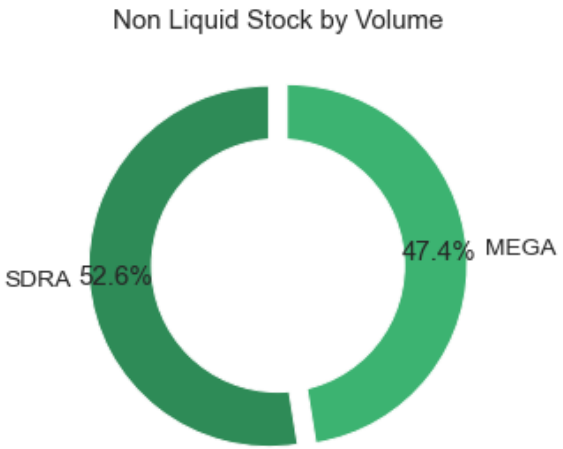
Each stock dataset contains 1211 rows and 1 feature

Explored Datasets



Insights and Analysis





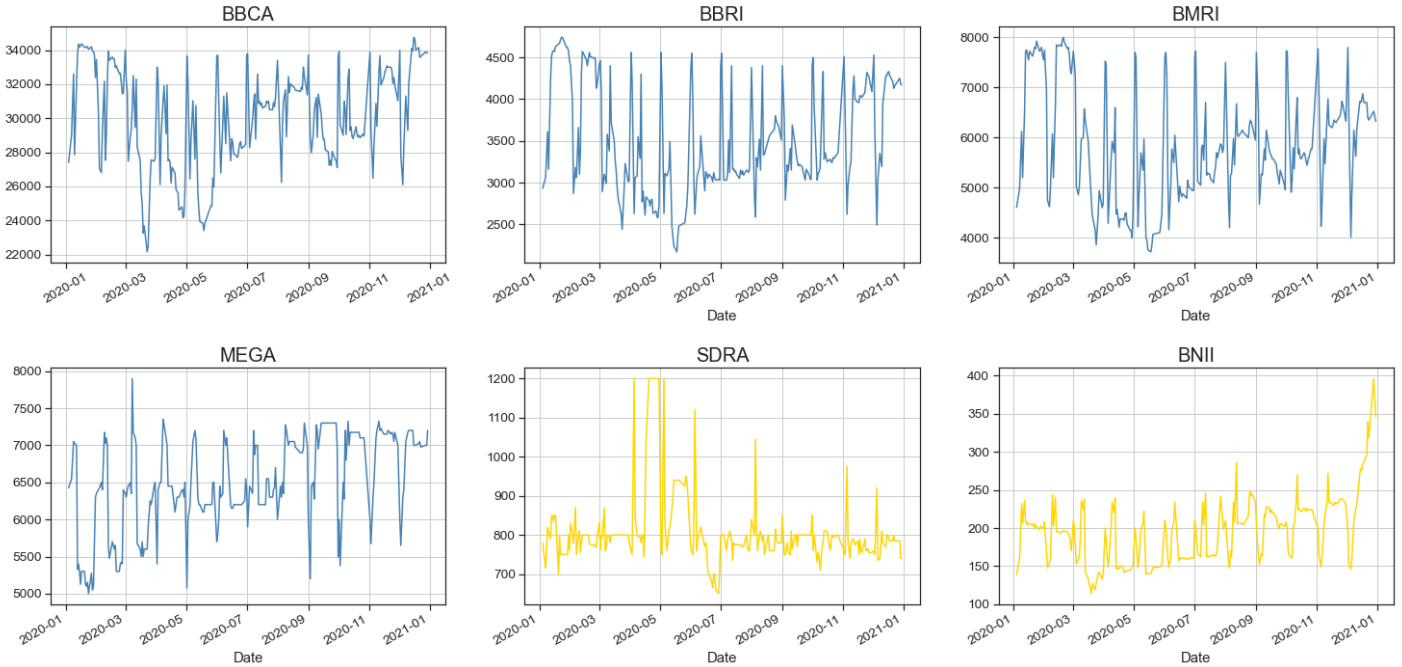
Most Liquid Stock

Non Liquid Stock

BBRI, **BMRI**, and **BBCA** are listed within the LQ45 stock index, with **BBRI** being the **most liquid** out of the three.

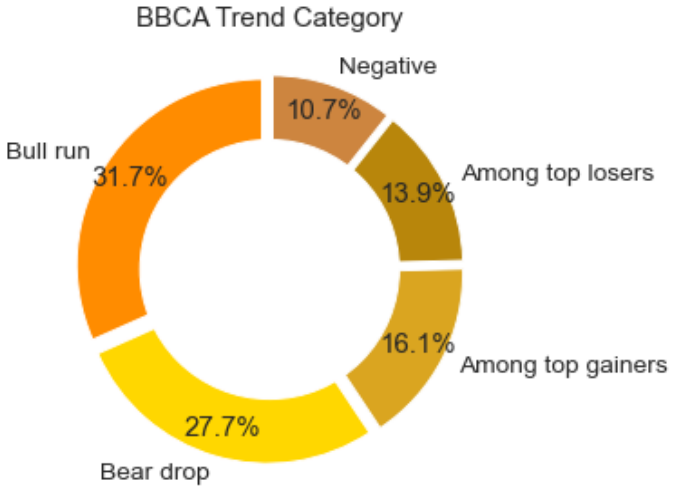
SDRA and **MEGA** had the most days of zero volume transaction.

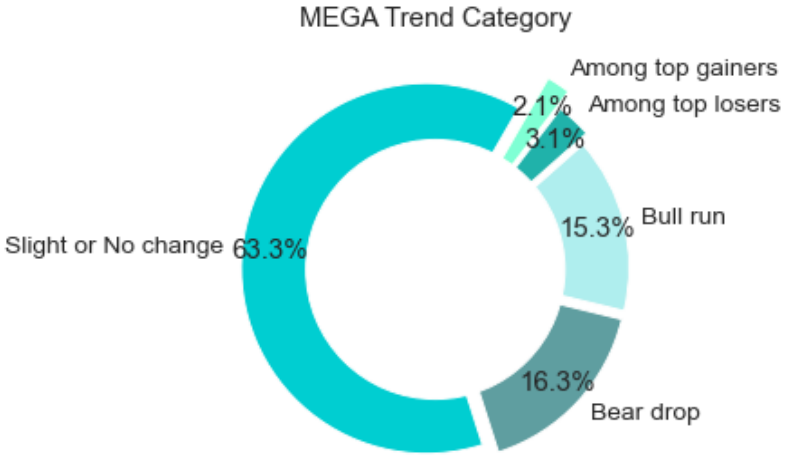
Stock Trends



All of the stocks are mostly sideways, with BBRI, BMRI, BBCA and MEGA showing uptrend signs on the second trimester of 2020. BNII shows sign of a bull run at the end of 2020 while SDRA continue its sideways trend.

Stock Return Category

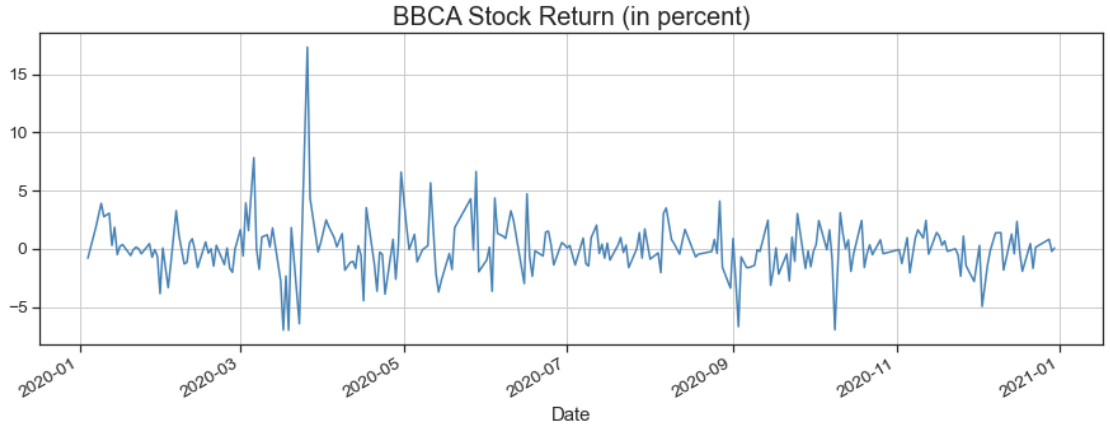




Returns ratio are categorized as below;

Slight or No Change	Slight Positive	Slight Negative	Positive	Negative	Among Top Gainers	Among Top Losers	Bull Run	Bear Drop
- 0.05 to 0.05	0.05 to 0.1	- 0.1 to - 0.05	0.1 to 0.3	- 0.3 to - 0.1	0.3 to 0.7	- 0.7 to - 0.3	> 0.7	< - 0.7

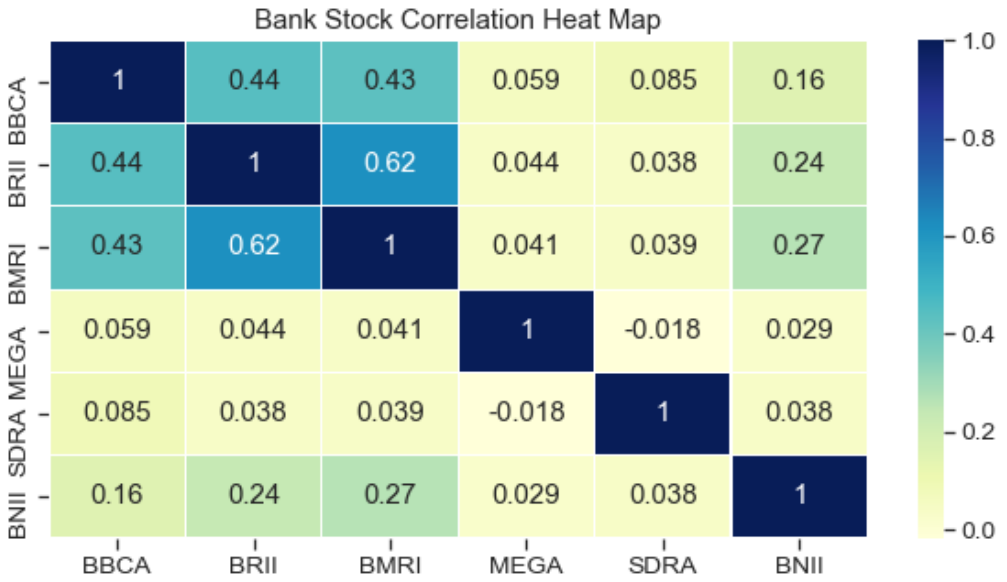
Stock Return Rate



Average Return	8.814 %
Min Return	- 7.0 %
Max Return	17.33 %

BBCA return rate is quite stable in between 5.0% and -5.0%. There is a spike in return sometimes around April 2020. Usually this happened due to good sentiment of the company.

Stock Return Correlation



It is recommended that investor do not put their capital/ funds for correlating stocks, such as BBRI and BMRI, in the same portfolio.

It is best to spread trading risk across stocks whose return are not correlated.

4

Modeling and Evaluation

What model best fit our data?

Datasets and Algorithms

Datasets are picked to represent each bank stock category.

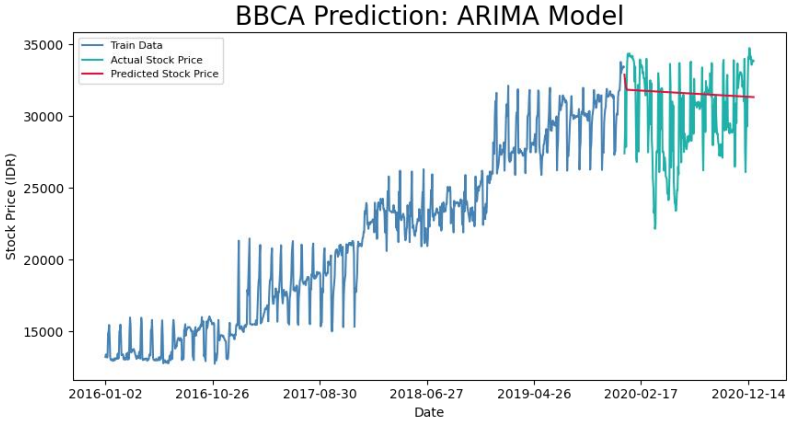
Close Price is the **only feature** used for modelling on each datasets.

Each dataset will be trained and fitted to these time-series model accordingly.

ARIMA

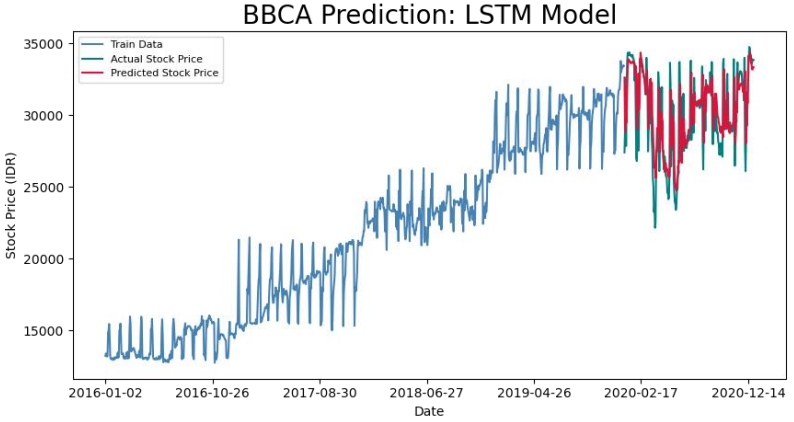
LSTM

BBCA Prediction



ARIMA

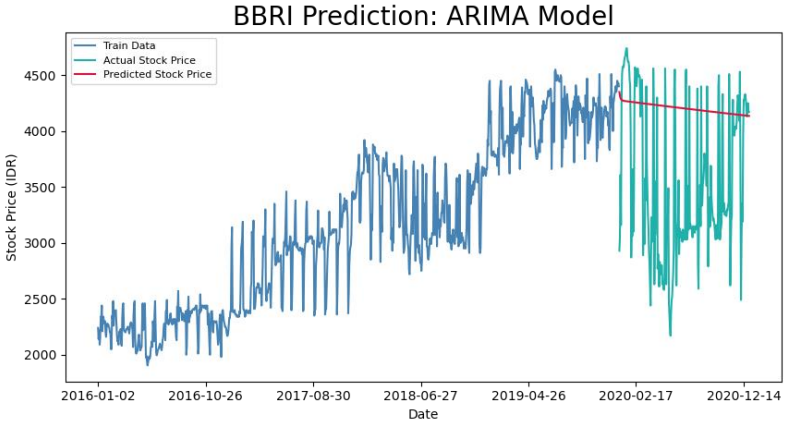
RMSE: 3310.37



LSTM

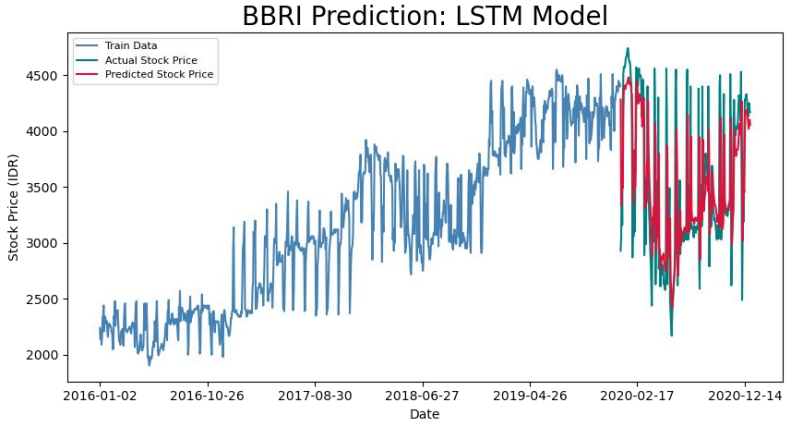
RMSE: 2026.47

BBRI Prediction



ARIMA

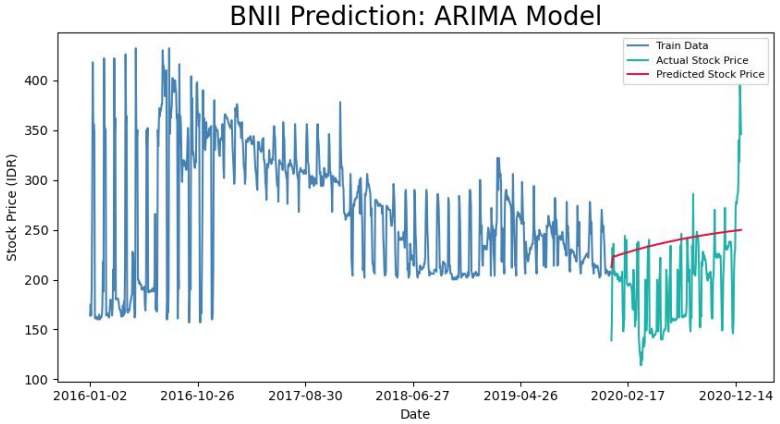
RMSE: 946.96



LSTM

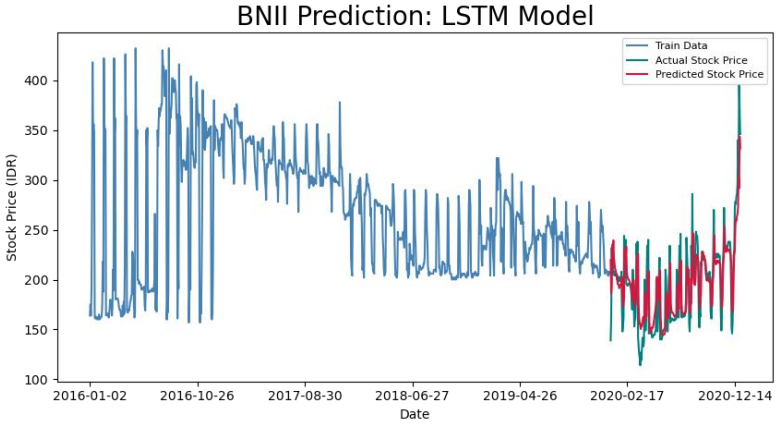
RMSE: 463.10

BNII Prediction



ARIMA

RMSE: 59.55



LSTM

RMSE: 25.58

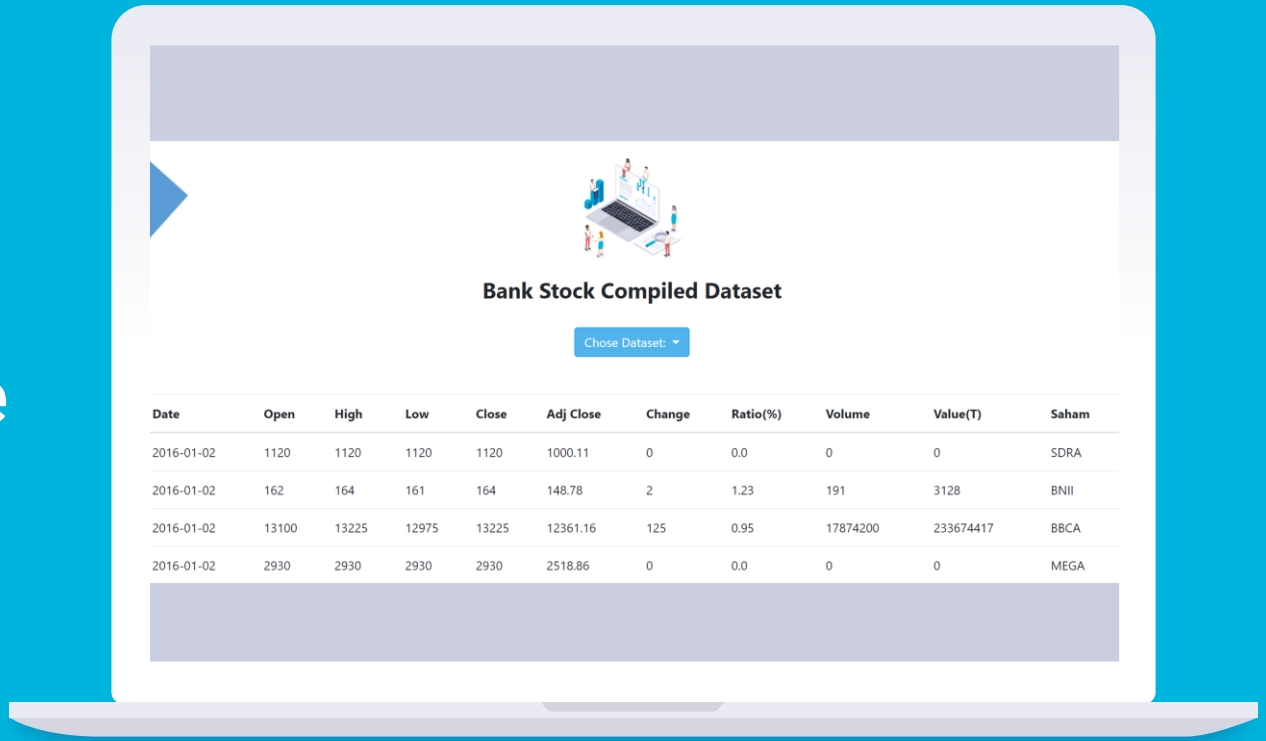
5

Deployment

What kind of result do we get from this project?

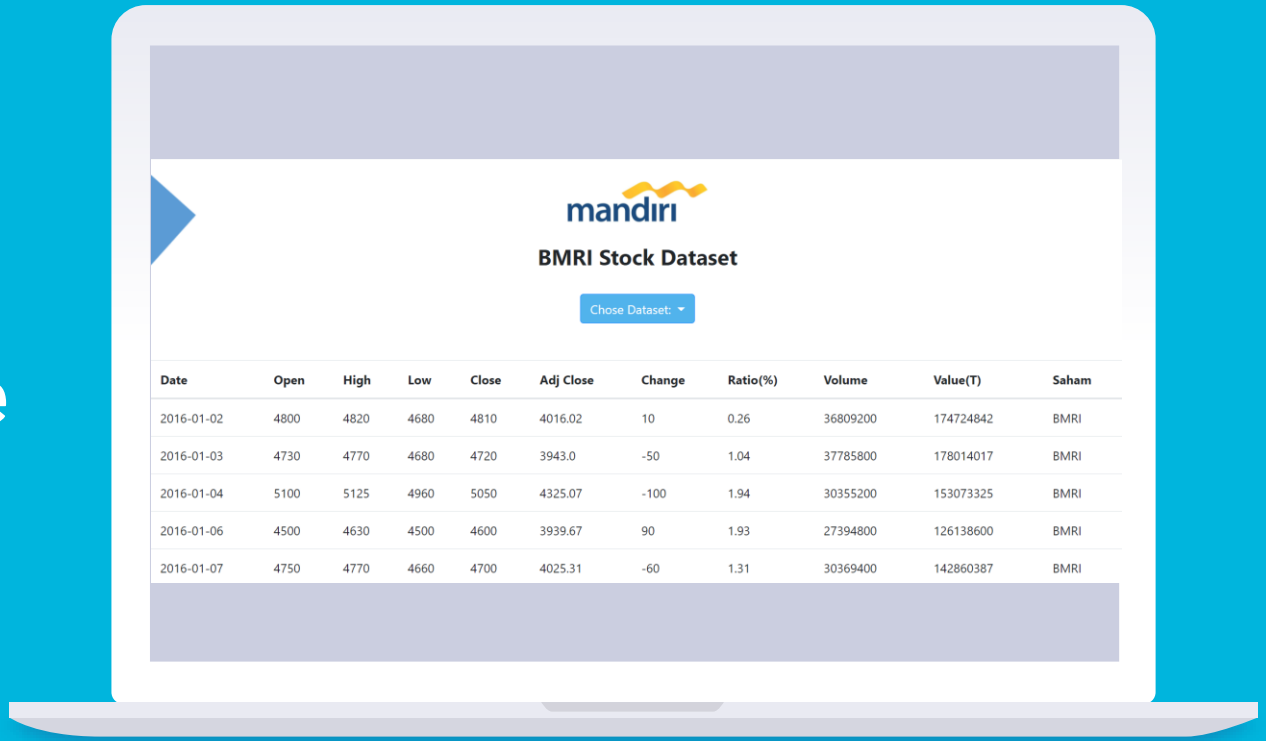
Dashboard Home Page

Dashboard Dataset Page (1)



Date	Open	High	Low	Close	Adj Close	Change	Ratio(%)	Volume	Value(T)	Saham
2016-01-02	1120	1120	1120	1120	1000.11	0	0.0	0	0	SDRA
2016-01-02	162	164	161	164	148.78	2	1.23	191	3128	BNII
2016-01-02	13100	13225	12975	13225	12361.16	125	0.95	17874200	233674417	BBCA
2016-01-02	2930	2930	2930	2930	2518.86	0	0.0	0	0	MEGA

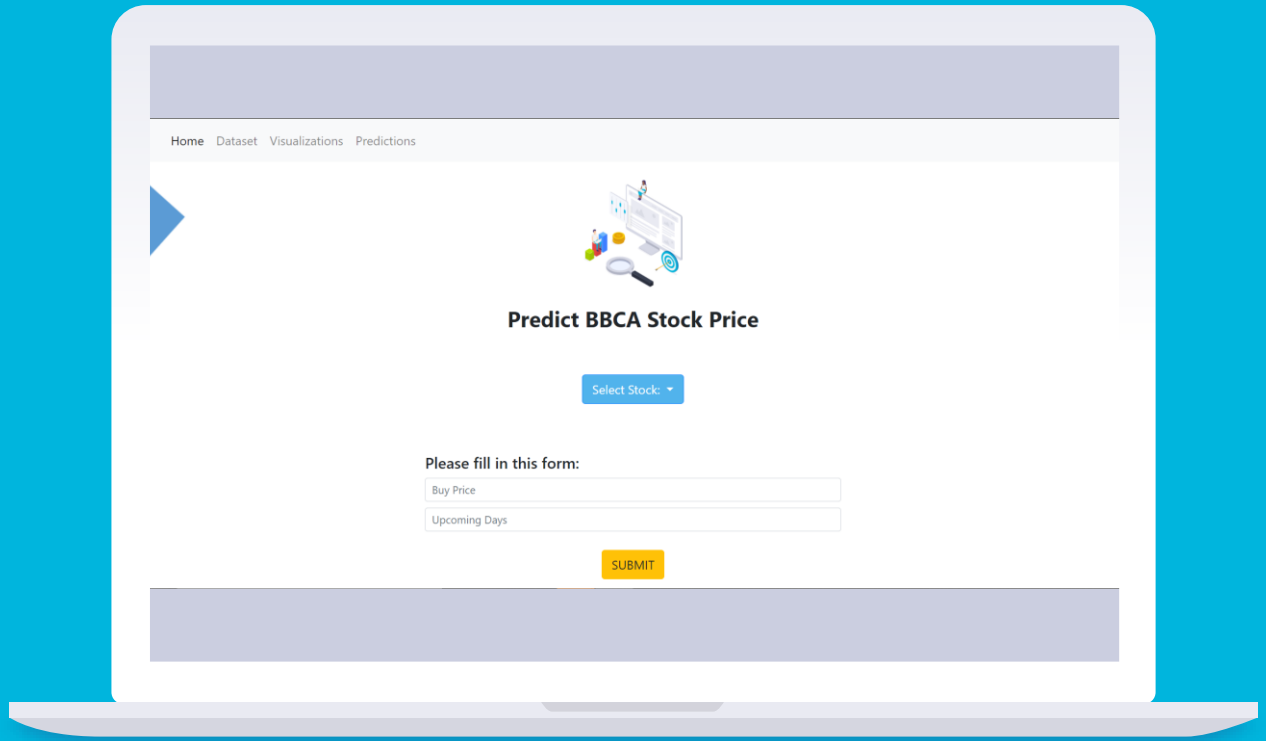
Dashboard Dataset Page (2)



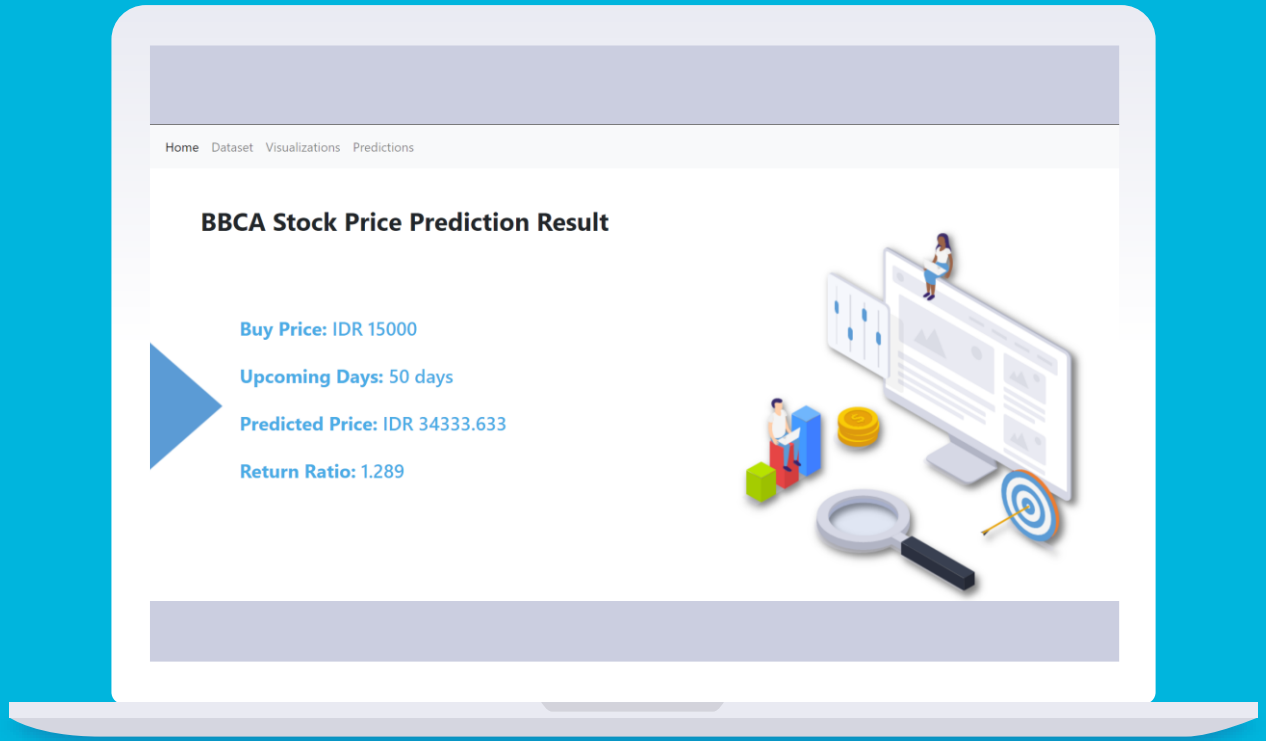
Date	Open	High	Low	Close	Adj Close	Change	Ratio(%)	Volume	Value(T)	Saham
2016-01-02	4800	4820	4680	4810	4016.02	10	0.26	36809200	174724842	BMRI
2016-01-03	4730	4770	4680	4720	3943.0	-50	1.04	37785800	178014017	BMRI
2016-01-04	5100	5125	4960	5050	4325.07	-100	1.94	30355200	153073325	BMRI
2016-01-06	4500	4630	4500	4600	3939.67	90	1.93	27394800	126138600	BMRI
2016-01-07	4750	4770	4660	4700	4025.31	-60	1.31	30369400	142860387	BMRI

Dashboard Visualization Page

Dashboard Predictions Page (1)



Dashboard Predictions Page (2)



LSTM Model gives the best prediction for each stock. We need to to take notes that this model gives best result when real data is given with a short-term prediction iteration.

Although this model seems to best fit to our data, it needs quite some computational effort for large datasets. Furthermore, the number of layers and parameter used for data training does not follow a specific rule and tuning the parameters is still a trial and error process.

Thank You!

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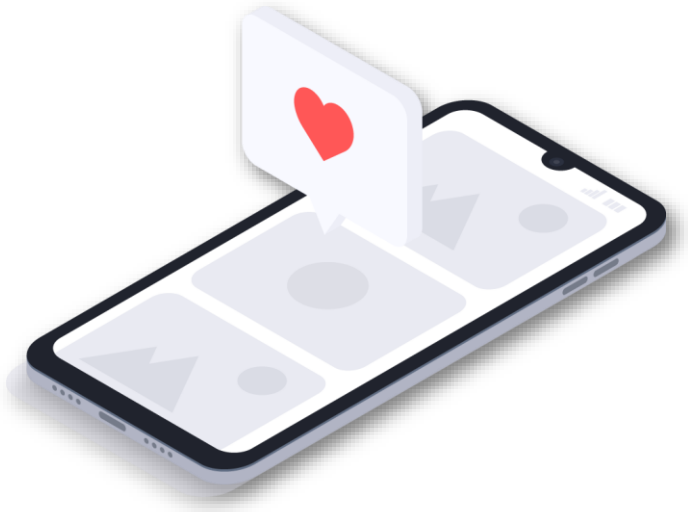
https://github.com/karina-anggraeni