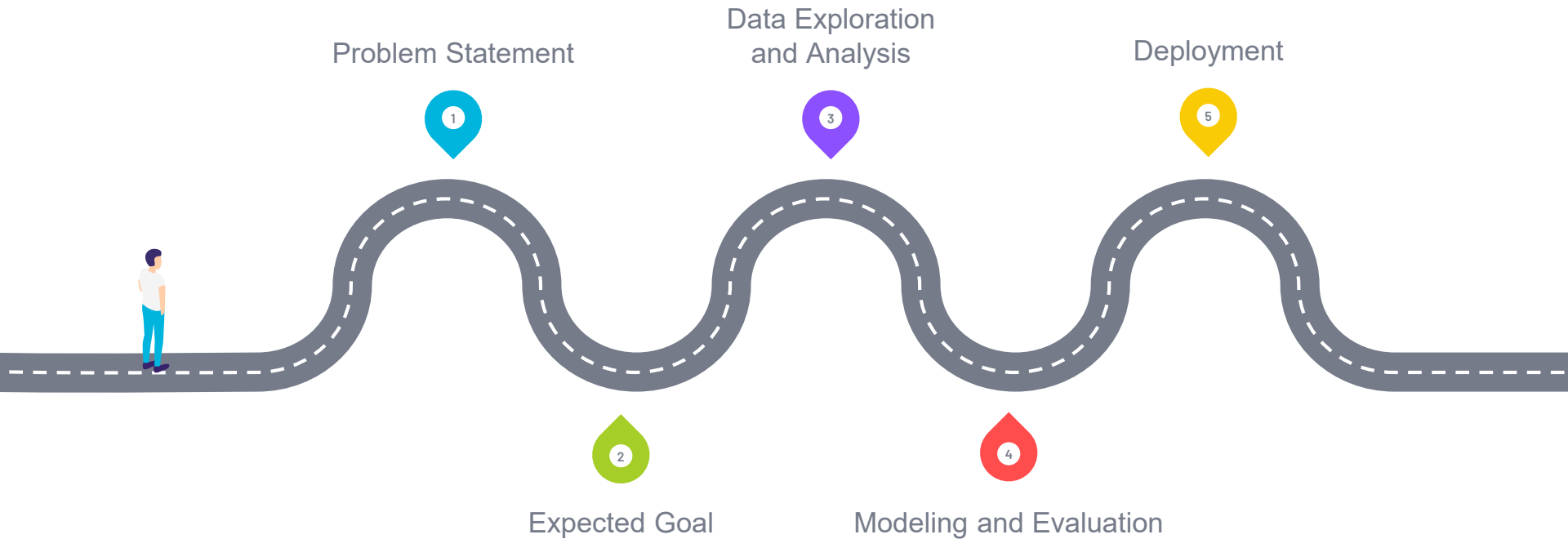


FORECASTING BANKING STOCK PRICES IN INDONESIA USING MACHINE LEARNING MODELING



Roadmap



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
- Improve pattern inconsistency

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

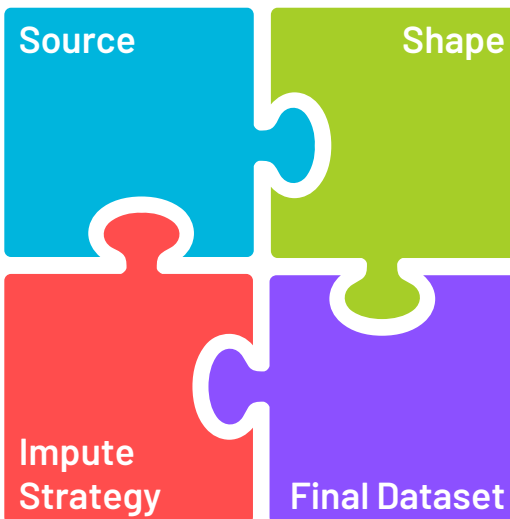
What insights can we get from data?



Datasets Summary

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

Missing value are filled using
backfill method

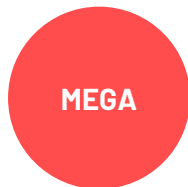


Compiled data of **7266 rows**
and **11 features** in total which
will be grouped to 6 smaller
datasets

Each stock dataset contains
1211 rows and **1 feature**

Explored Datasets

national private bank



state-owned public bank

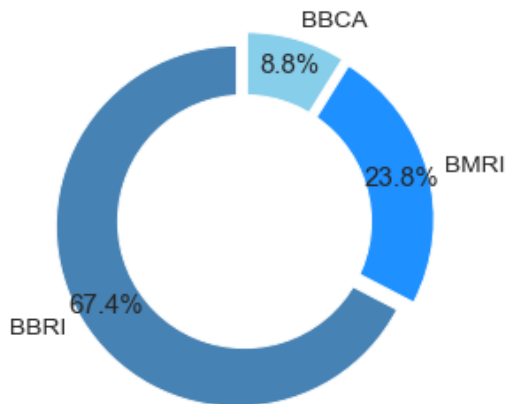


foreign private bank



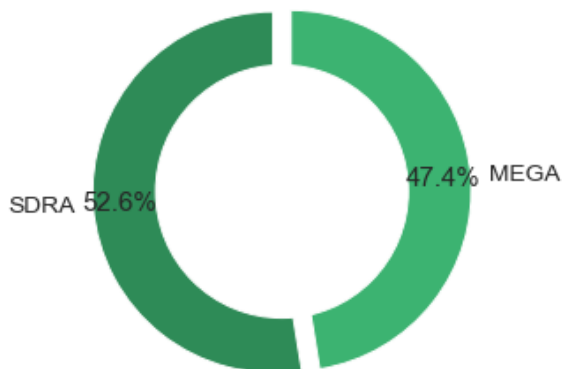
Insights and Analysis

Top 3 Liquid Stock by Volume



Most Liquid Stock

Non Liquid Stock by Volume

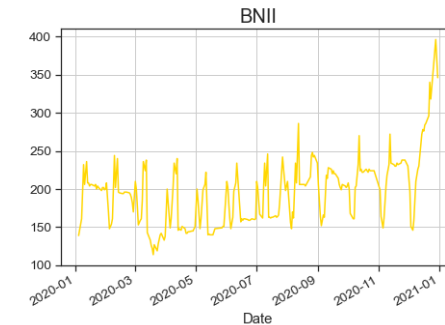
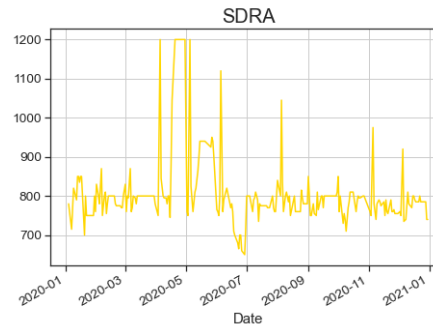
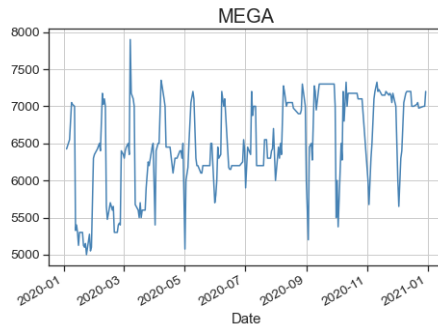
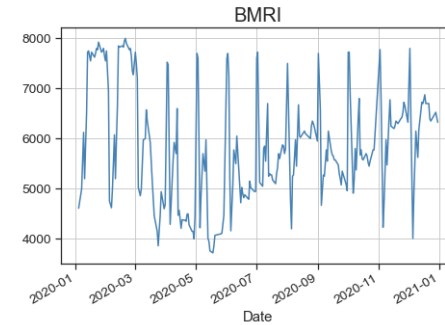
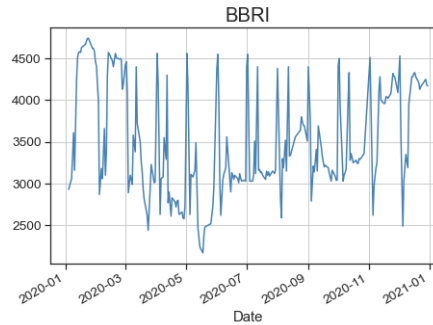
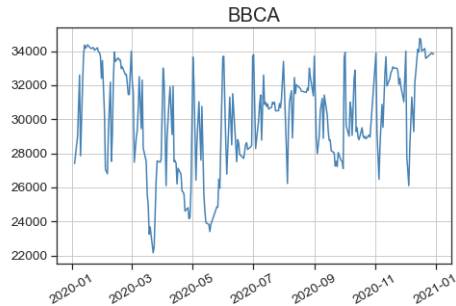


Non Liquid Stock

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

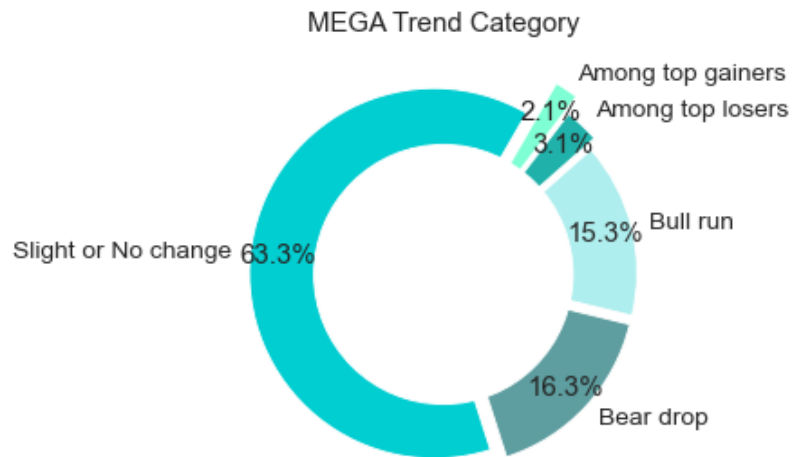
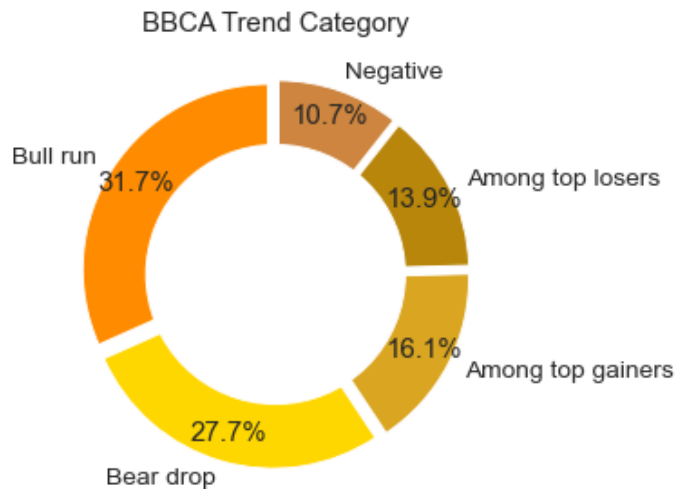
SDRA and MEGA had the most days of zero volume transaction.

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.

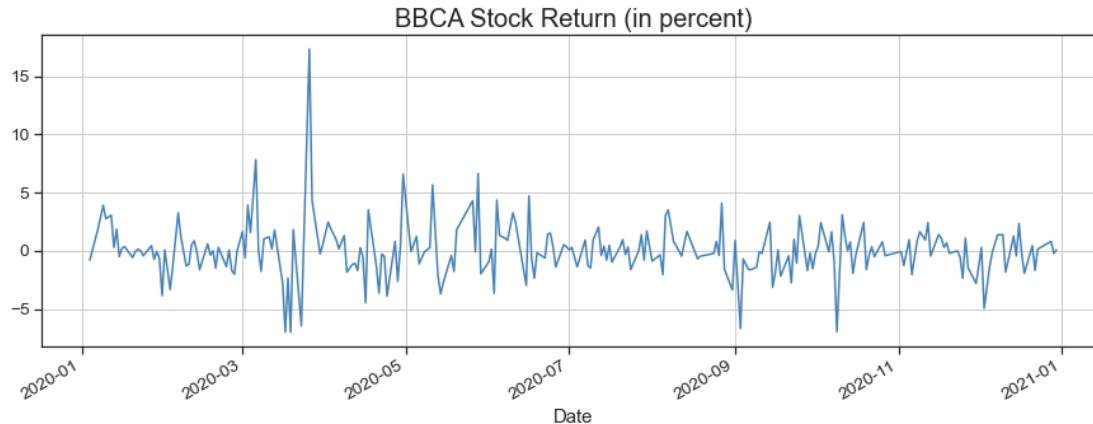
Stock Return Category



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

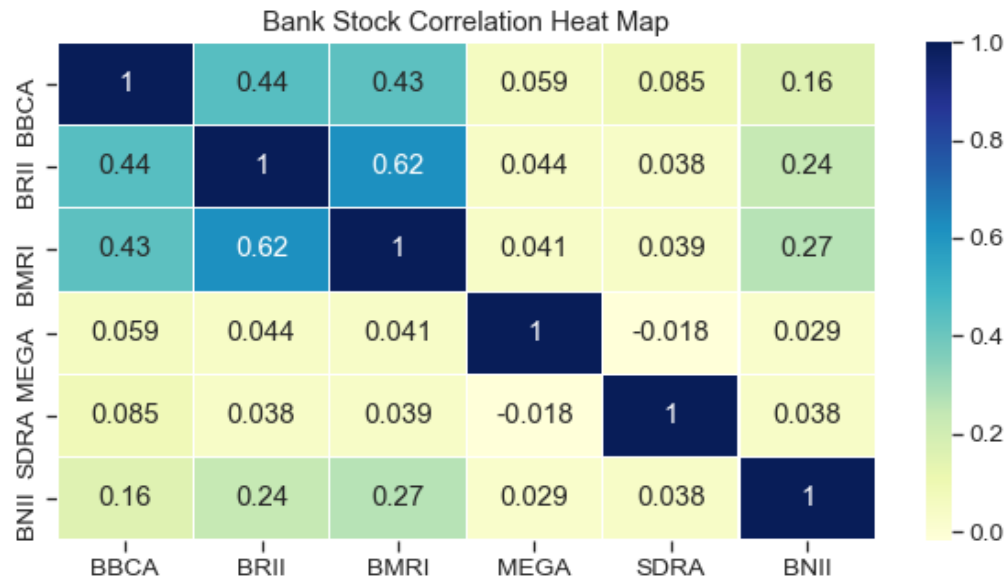
Stock Return Rate



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.



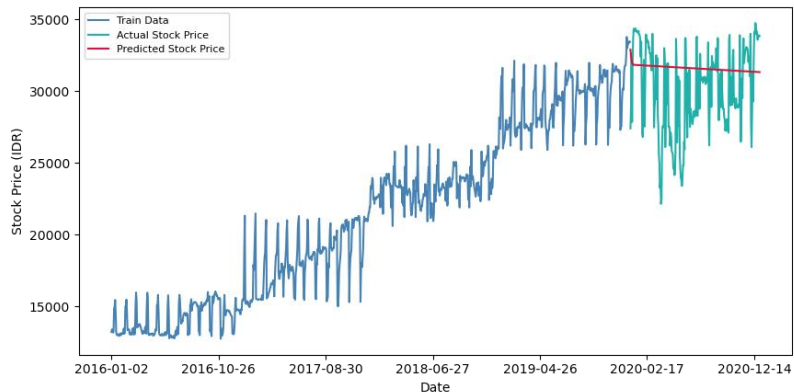
Close Price is the **only feature** used for modelling on each datasets.

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



BBCA Prediction

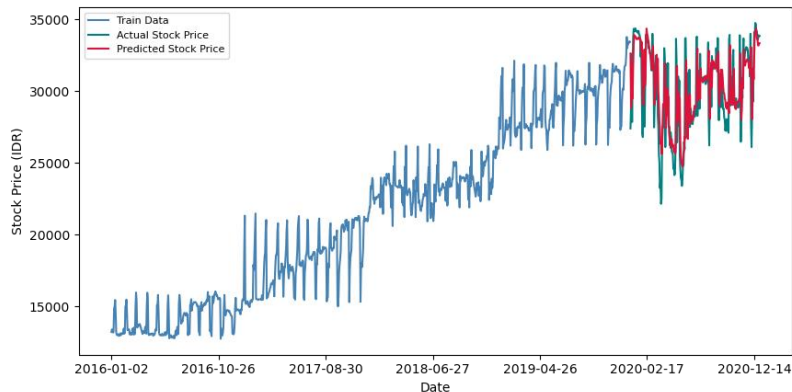
BBCA Prediction: ARIMA Model



ARIMA

RMSE: 3310.37

BBCA Prediction: LSTM Model



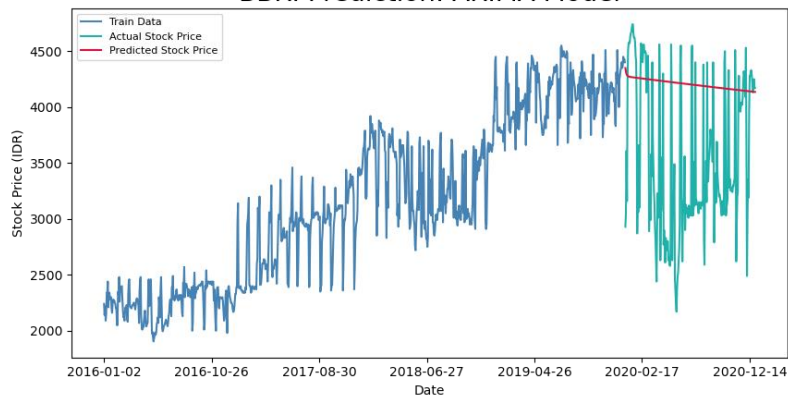
LSTM



RMSE: 2026.47

BBRI Prediction

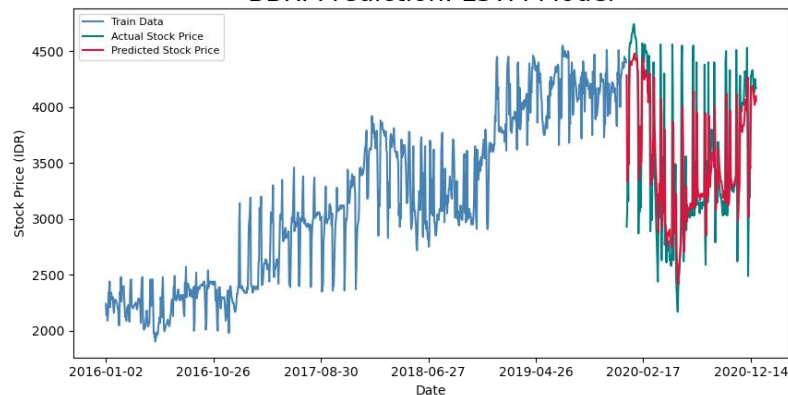
BBRI Prediction: ARIMA Model



ARIMA

RMSE: 946.96

BBRI Prediction: LSTM Model



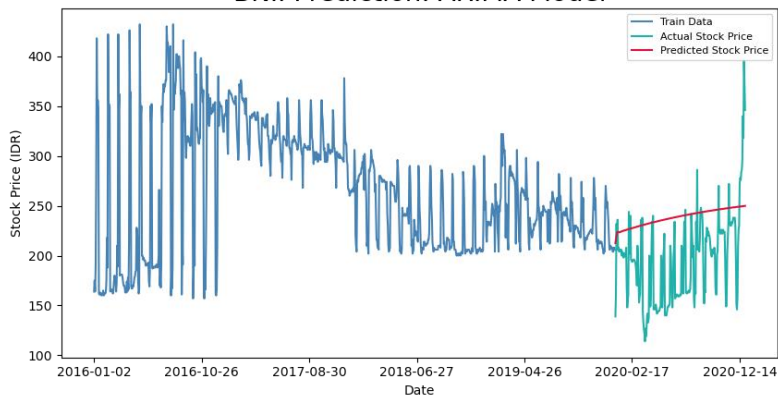
LSTM



RMSE: 463.10

BNII Prediction

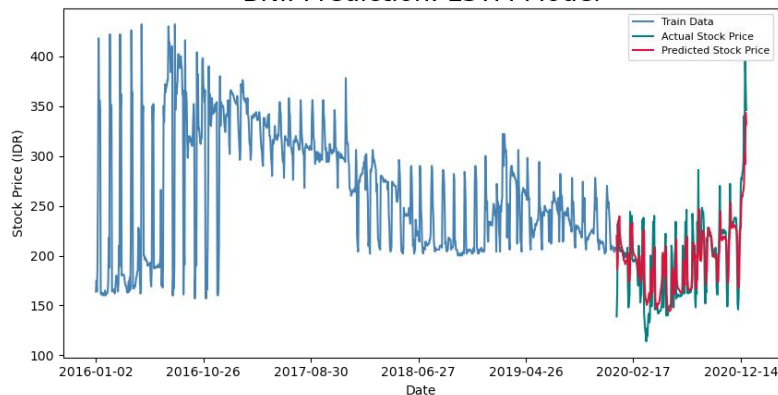
BNII Prediction: ARIMA Model



ARIMA

RMSE: 59.55

BNII Prediction: LSTM Model



LSTM

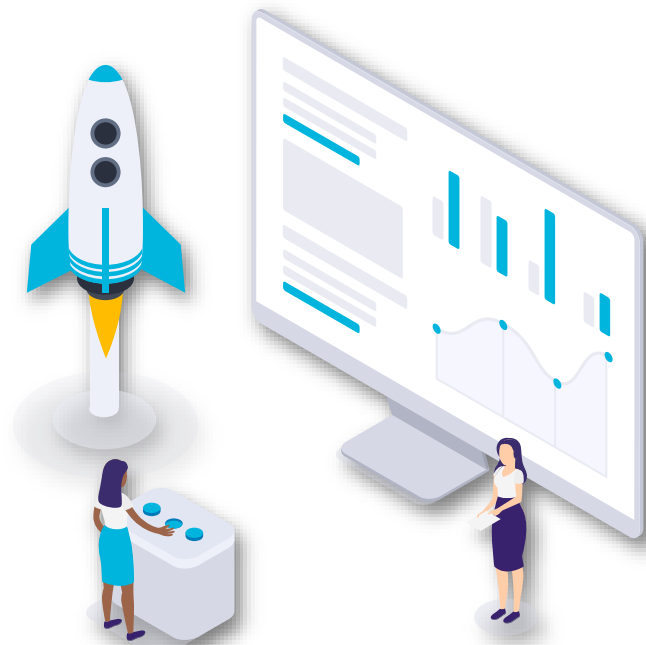


RMSE: 25.58

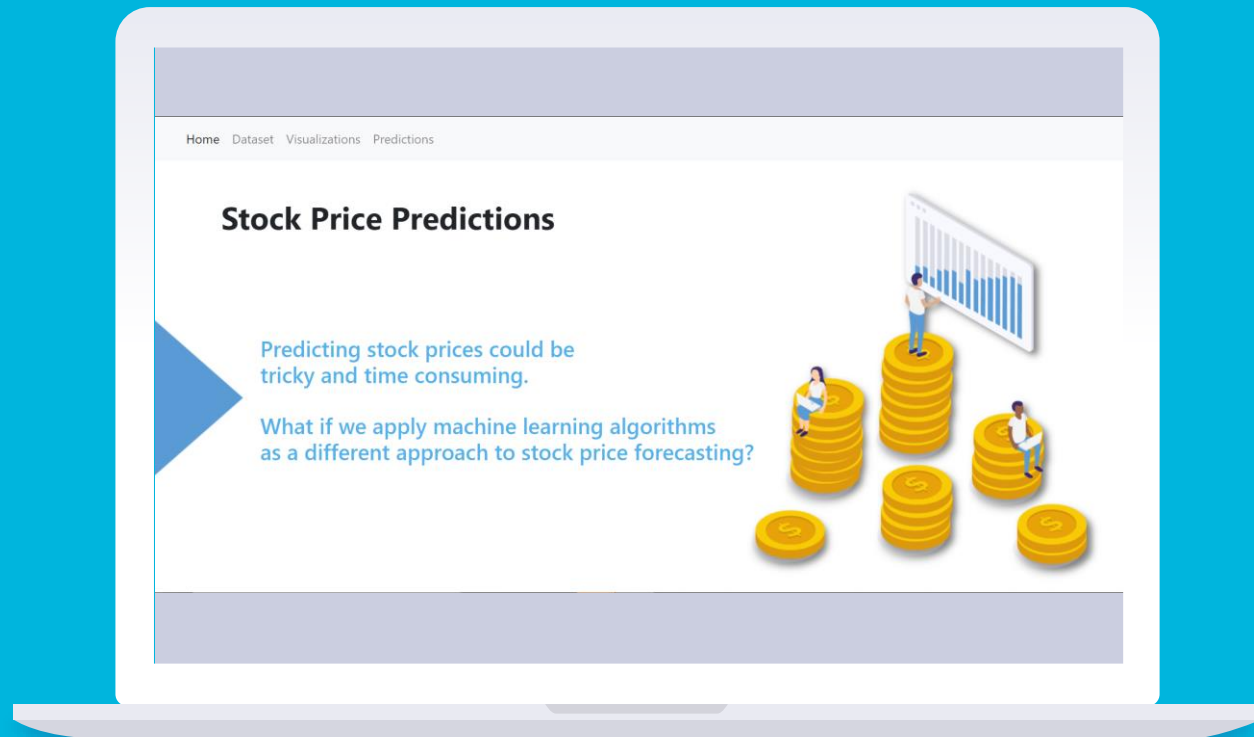
5

Deployment

What kind of result do we get from this project?



Dashboard Home Page



Dashboard Dataset Page

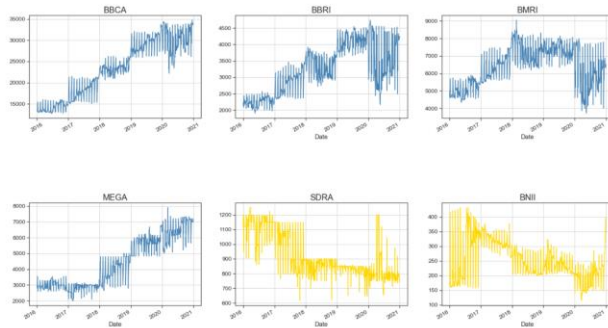


Bank Stock Compiled Dataset

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
2016-01-02	4800	4820	4680	4810	4016.02	10	0.26	36809200	174724842	BMRI

Dashboard Visualization Page

Stock Trends (2016 - 2020)

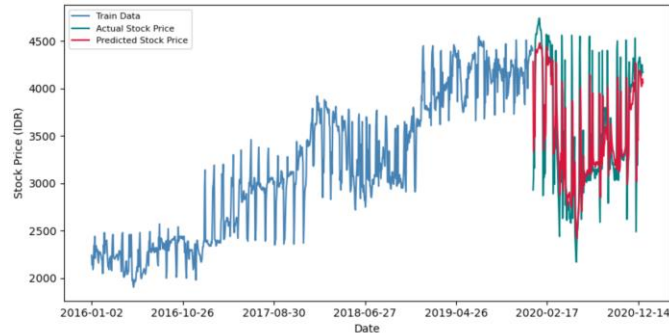


Jika dilihat berdasarkan data historis harga saham selama kurun waktu 5 tahun, terlihat jelas bahwa saham BBKA dan MEGA uptrend. Saham BBRI dan BMRI terlihat mengalami penurunan harga yang cukup signifikan selama tahun 2020. Sementara saham SDRA dan BNI cenderung downtrend.

Dashboard Predictions Page

BBRI Stock Prediction

BBRI Prediction: LSTM Model





LSTM Model gives **the best prediction** for each stock. This is because LSTM is a sequential model that is able to store past important informations and carried it forward.

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>

