Air Quality Index Monitoring and Prediction

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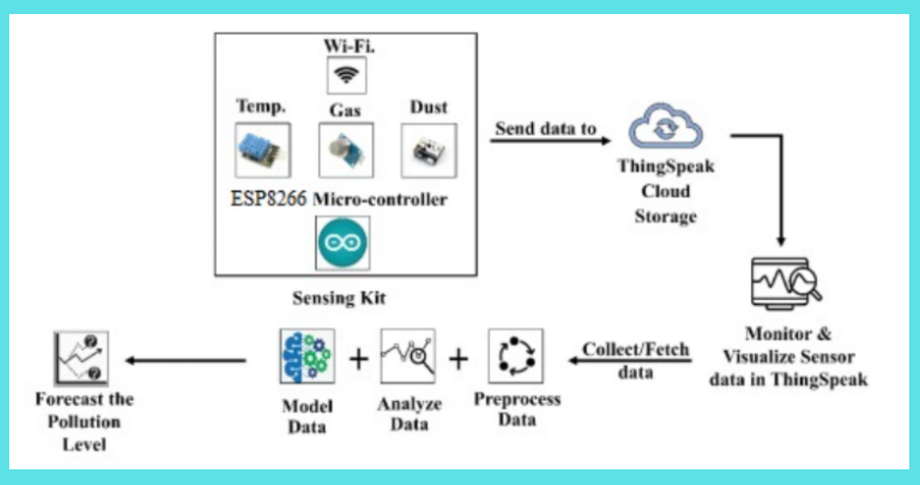
Background

Air Quality has become a growing concern in recent times due to increase of pollutants in air. To prevent Air Quality from degrading, its important to monitor emisions and predict future trends to better control it. A method which can be used for forecasting future AQI levels is using ML models. We explore different models such as ARIMA, SARIMA and Prophet in our research.

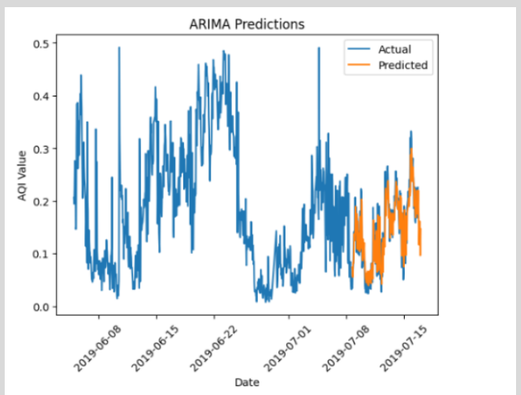
Methodology

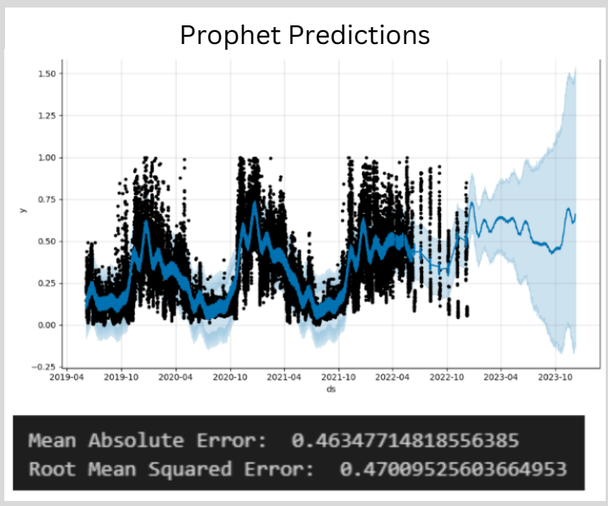
- An ESP8266 Module with MQ-7,MQ-135 and PM2.5 dust sensor was used for monitoring.
- For predictions models like ARIMA, SARIMA and Prophet were used.
- Each model was tested with a variations of parameters.
- Finally, rmse(root mean squared error) and mae(mean absoluter error) were observed.

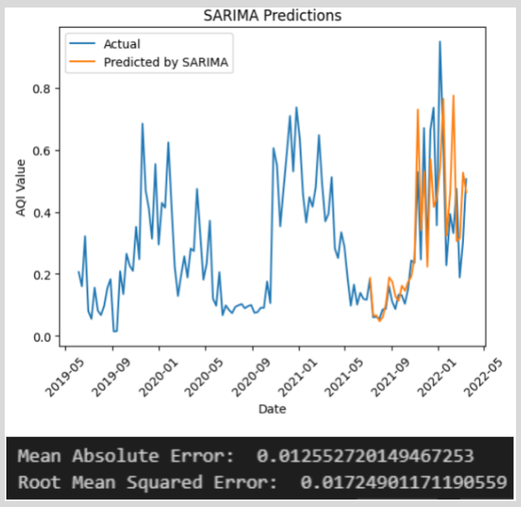


Results

Results for ARIMA, SARIMA and Prophet applied on Air Quality Index time series data extracted from the sensors are given in the following graphs.







Conclusions

Seasonal ARIMA was the best performing model for the given dataset. While ARIMA lacked seasonality and Prophet was overfitting on training data.

Future work in progress includes:

- Applying Temporal Fusion Transformer(tft) on the data.
- Performance enhancements of regressors.
- Caliberating Sensors More Accurately.

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