

mlangles
Predictive AI

Stock Price Prediction Use Case - Prophet



REVENUE OPERATIONS

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INSIGHTS



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ASSET MANAGEMENT



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ENABLEMENT



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OPERATIONS



About mlangles Predictive AI

mlangles is a comprehensive AI platform designed to manage the lifecycle of data and models, offering streamlined solutions for every stage of the process.

Through its Predictive AI component, mlangles provides a suite of tools to navigate efficiently through each phase of AI project development, encompassing data engineering, development, deployment, and monitoring. It facilitates continuous integration, continuous deployment, continuous training, continuous monitoring (CI-CD-CT-CM), enabling enterprises to effectively manage their AI initiatives.

Objective of the Use Case

We are trying to create a machine learning model that can accurately forecast future stock prices based solely on historical stock price data. The objective is to aid investors in making statistically informed trades.

Overview of Dataset and Use Case

The dataset was sourced from Kaggle, but the data was originally acquired from The Investor's Exchange API. The dataset contains five year's worth of stock data, from 2013 to 2018, and contains the following features: Date, Opening Price, Highest Price, Lowest Price, Closing Price, and Volume of Stocks Traded.



Working of the Use Case

Step 1: Data Pipeline

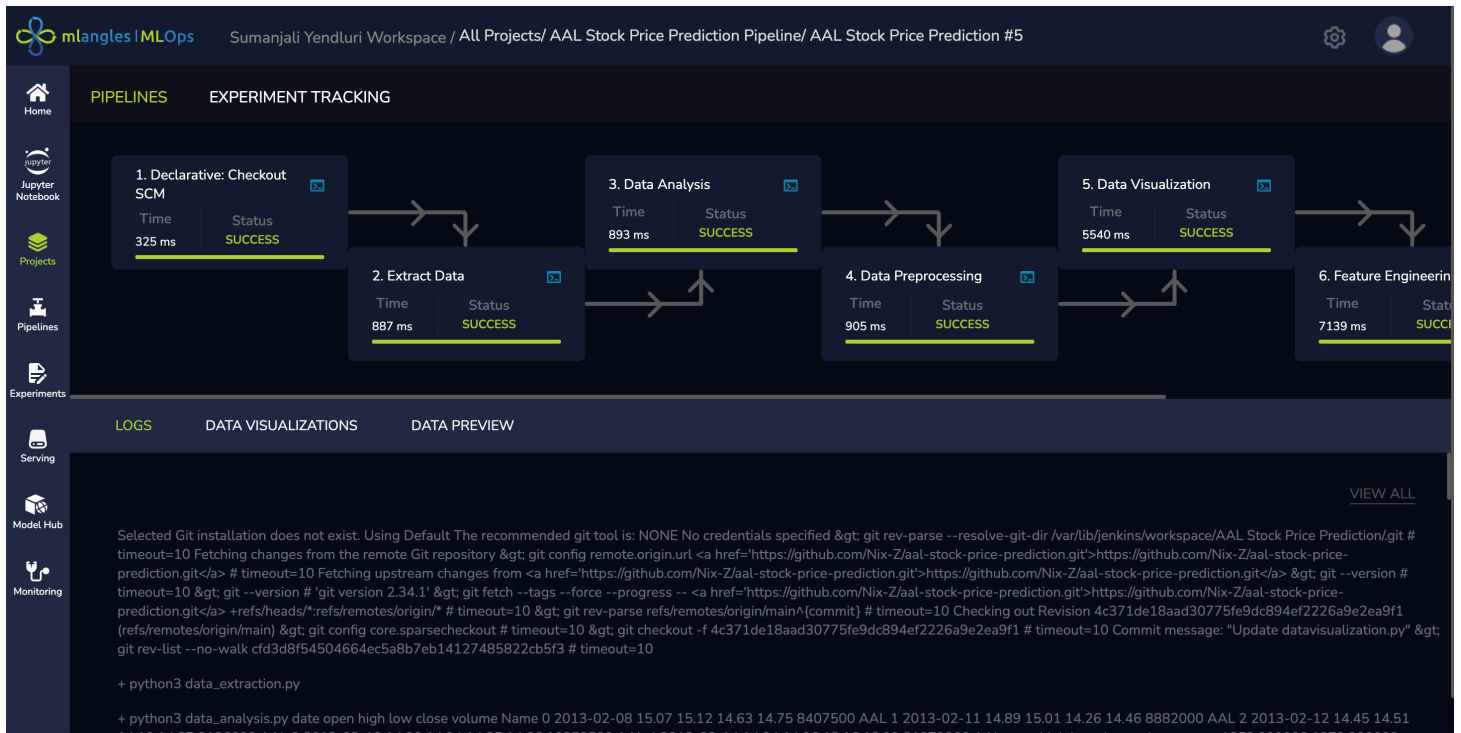
Extract Data: Loaded data from the source (source was in GitHub Repository)

Data Analysis: Performed an analysis of the data to get an overview of the data and determine whether there were any issues with the data.

Data Preprocessing: Prepared data for model development and feature engineering. Dropped redundant data column: name.

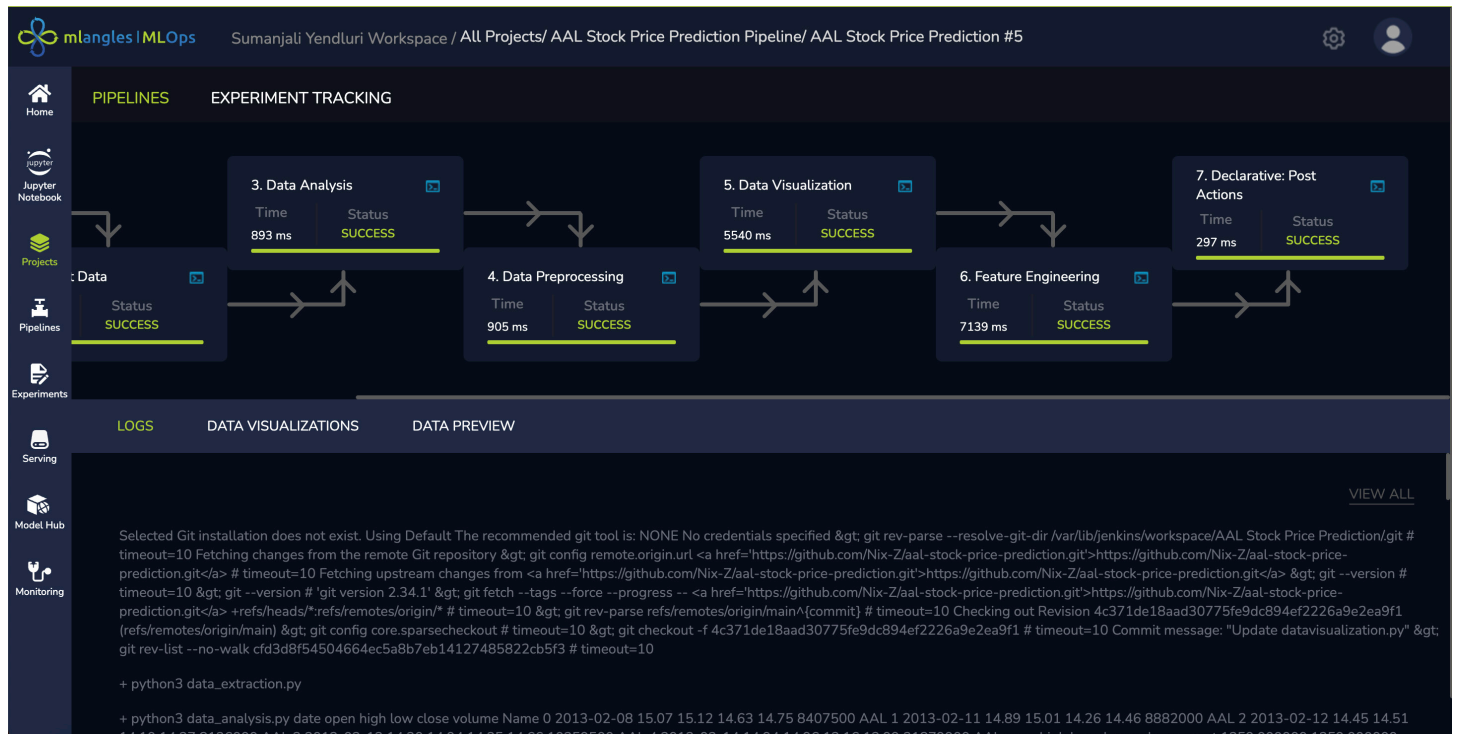
Data Visualization: Displayed two graphs, a line graph and a candlestick graph. The line graph focused on the closing price performance of the stock and the candlestick graph showed the entire price movement of the stock.

Feature Engineering: Final preparation of data before experiments are run. In this case, not much was done, just dropped a few more feature columns: Open, High, Low, and Volume.

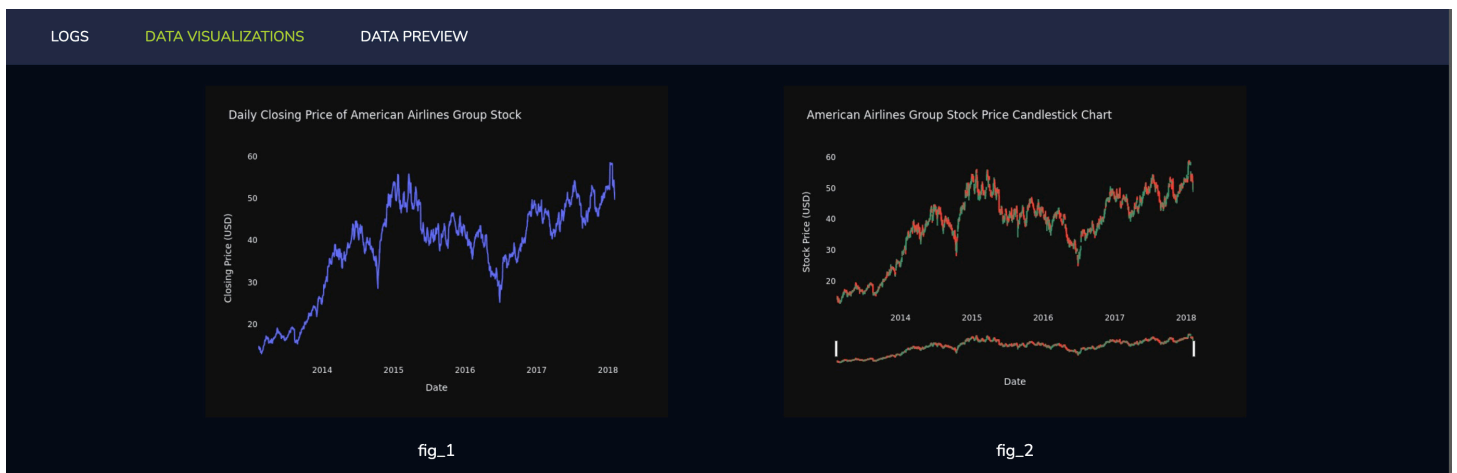


Data Versioning:

- ▶ Various processed data versions can be generated through different transformations applied to the same raw dataset, such as deleting columns or applying various transformations on specific columns.
- ▶ Throughout the data pipeline, diverse transformations can be executed at each iteration. Consequently, the resulting data at the pipeline's end is systematically versioned.
- ▶ Given that each version of the final data is distinct, models trained on these different versions will exhibit varying behaviors.



An overview of the data Pipeline



Fig_1 is a line graph displaying the performance of the AAL stock's closing price over a 5-year period.

Fig_2 is a candlestick graph displaying the entire price movement of the AAL stock.

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IMLOps

Sumanjali Yendluri Workspace / All Projects/ AAL Stock Price Prediction Pipeline/ AAL Stock Price Prediction #3



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DATA PREVIEW

DATE	CLOSE
2013-02-08	14.75
2013-02-11	14.46
2013-02-12	14.27
2013-02-13	14.66
2013-02-14	13.99
2013-02-15	14.5
2013-02-19	14.26
2013-02-20	13.33
2013-02-21	13.37
2013-02-22	13.57



Preview of the data after the data pipeline has been run to completion.


Step2: Experiment Tracking


Multiple experiments were run using the Prophet machine learning model. After comparing the accuracy and RMSE of each experimental run, it was observed that the best results were from using Prophet without any hyperparameters. In the end, the best RMSE was 4.31 with a score of 0.92.


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+ New Run

Run Configuration

Clear Filter

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RUN ID	RUN NAME	STATUS	CREATED BY	START TIME	END TIME
3a430e5be81f417b99f8d03ff3fd37b6	AAL Stock Price Prediction Prophet #10	Success	Sumanjali Yendluri	3/19/2024, 10:35:28 AM	3/19/2024, 10:35:32 AM
5b992877579a447ab21f5cd73ecf7f00	AAL Stock Price Prediction Prophet #9	Success	Sumanjali Yendluri	3/19/2024, 10:34:42 AM	3/19/2024, 10:34:46 AM
30e64009215e40aa8532f1312e86d662	AAL Stock Price Prediction Prophet #7	Success	Sumanjali Yendluri	3/19/2024, 10:33:26 AM	3/19/2024, 10:34:05 AM
67ba3a69dd3a4ccab36556855e8b836f	AAL Stock Price Prediction Arima #1	Failed	Sumanjali Yendluri	3/19/2024, 10:33:09 AM	3/19/2024, 10:33:10 AM
920af031149f4b9d995327d71010564a	AAL Stock Price Prediction Prophet #6	Success	Sumanjali Yendluri	3/19/2024, 10:31:49 AM	3/19/2024, 10:31:53 AM
67ae28c6950a4dfc9e0f772e8d67017e	AAL Stock Price Prediction Prophet #4	Success	Sumanjali Yendluri	3/19/2024, 10:31:23 AM	3/19/2024, 10:31:29 AM
86953f37584c40369f225a048882b324	AAL Stock Price Prediction Prophet #5	Success	Sumanjali Yendluri	3/19/2024, 10:31:23 AM	3/19/2024, 10:31:28 AM
77ce7f71ba9d45fdad942e4e7786a3e0	AAL Stock Price Prediction Prophet #3	Success	Sumanjali Yendluri	3/19/2024, 10:17:26 AM	3/19/2024, 10:17:32 AM
f135ad3e07a54f4e88e8904c2b8d35ff	AAL Stock Price Prediction #2	Success	Sumanjali Yendluri	3/19/2024, 10:16:27 AM	3/19/2024, 10:16:49 AM
e10c6c260e7e4dc8ac39cd475a7c0b68	AAL Stock Price Prediction ALL #1	Failed	Sumanjali Yendluri	3/19/2024, 10:15:37 AM	3/19/2024, 10:15:39 AM
17994601cd7245ec84a0cc8c517ce0bb	AAL Stock Price Prediction Prophet #1	Success	Sumanjali Yendluri	3/19/2024, 10:15:29 AM	3/19/2024, 10:15:35 AM

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PIPELINES EXPERIMENT TRACKING

Go to Serving

Run Name : AAL Stock Price Prediction Prophet #8 Run ID : 86955ee2fa334e008706634006333296 Created AT : 3/18/2024, 11:05:50 PM

Exp Name: AAL Stock Price ... Success
86955ee2fa334e008706634006333296
Created by Sumanjali Yendluri 3/18/2024, 11:05:50 PM

NAME	VALUE
Best Algorithm	Prophet

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PIPELINES EXPERIMENT TRACKING

Go to Serving

Run Name : AAL Stock Price Prediction Prophet #8 Run ID : 86955ee2fa334e008706634006333296 Created AT : 3/18/2024, 11:05:50 PM

Exp Name: AAL Stock Price ... Success
86955ee2fa334e008706634006333296
Created by Sumanjali Yendluri 3/18/2024, 11:05:50 PM

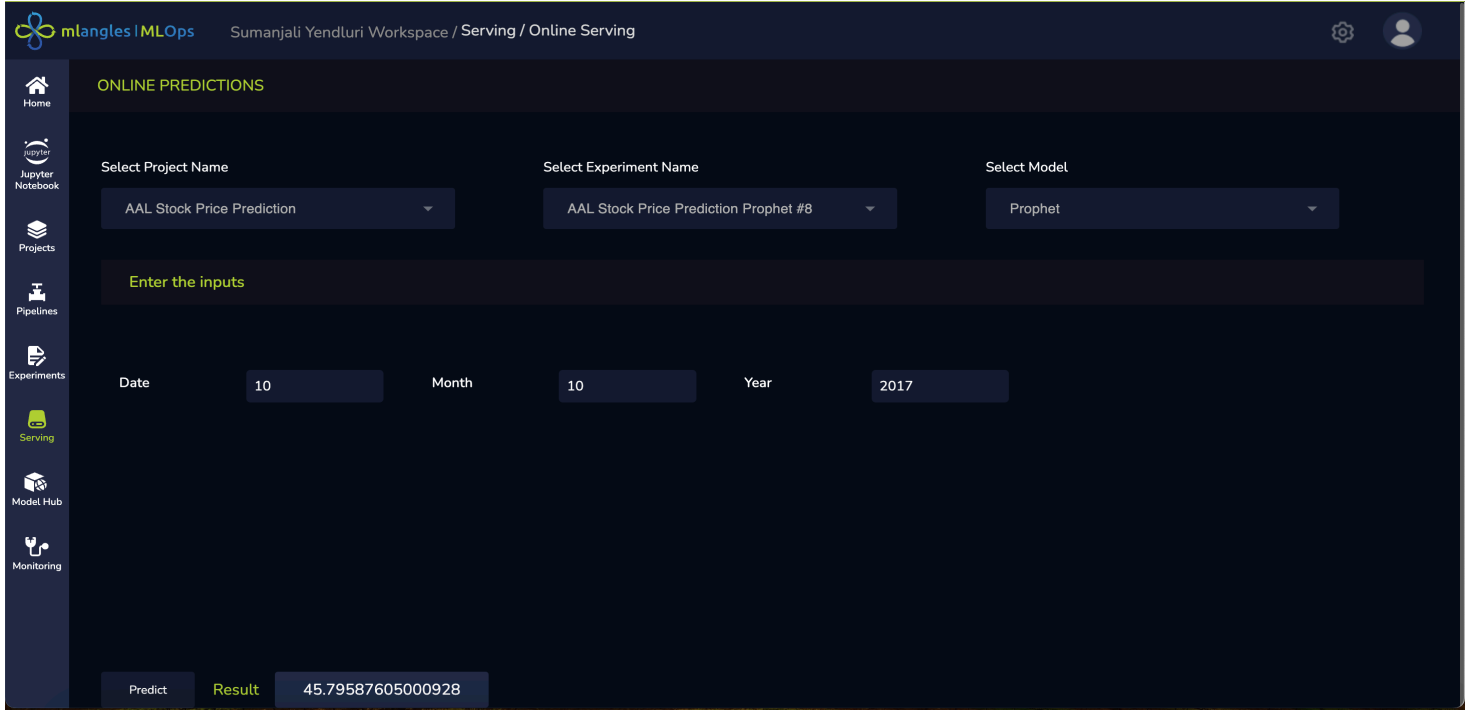
NAME	VALUE
MAE	3.6674483024537405
MSE	17.56179961950371
RMSE	4.190680090331844
Score	0.9269161117064237

Model Versioning:

- ▶ Models are sensitive to a plethora of hyperparameters and parameters, including learning rate, loss function, and optimizers.
- ▶ Consequently, a model selected for training, with both the model and final data versions remaining constant but changes in parameters, may yield differing performance metrics.
- ▶ These diverse model versions can be uploaded to the model hub, facilitating the management of multiple iterations and variations.

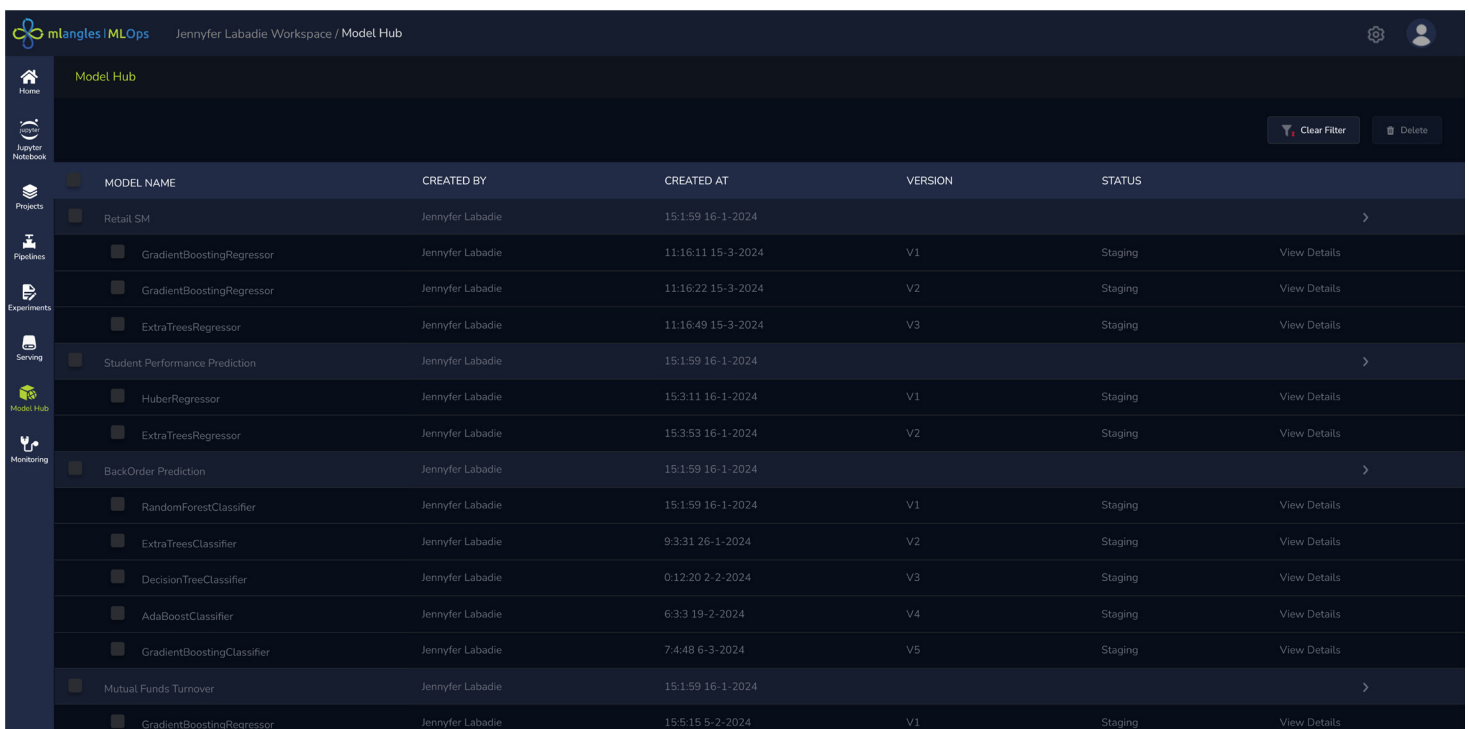
Step 3: Serving

Performed an online prediction using a random date from within the timeline of our data. The forecasted closing price for the stock on October 10, 2017, is \$53.09, while the actual closing price for that day was \$53.03. Our prediction was off six cents.



Model Hub:

- ▶ Trained models are uploaded to the model hub, whereupon deployment, a REST API endpoint is automatically generated.
- ▶ Data is transmitted to this endpoint as a request, triggering the model to execute a prediction and return the output as the response to the request.

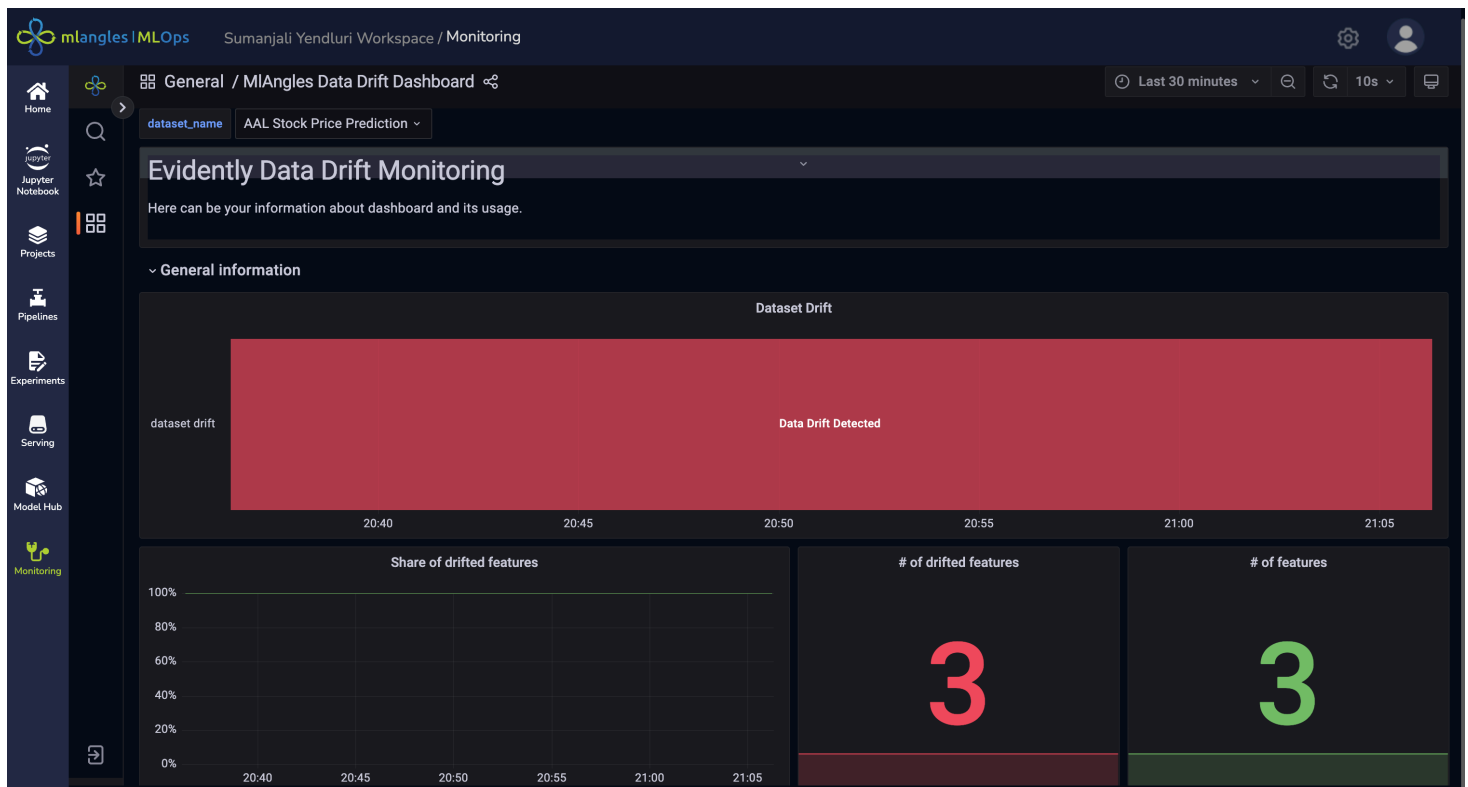


MODEL NAME	CREATED BY	CREATED AT	VERSION	STATUS
Retail SM	Jennyfer Labadie	15:1:59 16-1-2024		
GradientBoostingRegressor	Jennyfer Labadie	11:16:11 15-3-2024	V1	Staging
GradientBoostingRegressor	Jennyfer Labadie	11:16:27 15-3-2024	V2	Staging
ExtraTreesRegressor	Jennyfer Labadie	11:16:49 15-3-2024	V3	Staging
Student Performance Prediction	Jennyfer Labadie	15:1:59 16-1-2024		
HuberRegressor	Jennyfer Labadie	15:3:11 16-1-2024	V1	Staging
ExtraTreesRegressor	Jennyfer Labadie	15:3:53 16-1-2024	V2	Staging
BackOrder Prediction	Jennyfer Labadie	15:1:59 16-1-2024		
RandomForestClassifier	Jennyfer Labadie	15:1:59 16-1-2024	V1	Staging
ExtraTreesClassifier	Jennyfer Labadie	9:3:31 26-1-2024	V2	Staging
DecisionTreeClassifier	Jennyfer Labadie	0:12:20 2-2-2024	V3	Staging
AdaBoostClassifier	Jennyfer Labadie	6:3:3 19-2-2024	V4	Staging
GradientBoostingClassifier	Jennyfer Labadie	7:4:48 6-3-2024	V5	Staging
Mutual Funds Turnover	Jennyfer Labadie	15:1:59 16-1-2024		
GradientBoostingRegressor	Jennyfer Labadie	15:5:15 5-2-2024	V1	Staging

Step 4: Monitoring

Data drift is the gradual or abrupt change in the statistical properties of training data in a machine learning model. There are three types of data drift: sudden drift, gradual drift, and seasonal drift. Sudden drift occurs when there is a sudden and abrupt change in the distribution of data. Gradual drift, the opposite of sudden drift, is a slow, steady change in the distribution of data. Finally, seasonal drift is when shifts in the data distribution are linked to time-based patterns. Data drift can cause several issues with machine learning models, including reduced model performance, loss of generalization, and model degradation.

We can see here in the monitoring screen that all the features have drifted. Since these features are related to financial matters, which are dependent on a multitude of extraneous factors including seasonality, the data features are prone to data drift. In the future, we can control this issue with continuous monitoring and model retraining.



Conclusion

In conclusion, we can see that the Prophet model is effective at forecasting stock prices. However, the model is also prone to data drift, requiring continuous monitoring and retraining of the model. Still, with care, this model holds excellent potential for use in the investment market.

To Setup Demo

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