Building a Demand Forecast | Cortex

Introduction

- This Hands-on Exercise is a part of **Building A Demand Forecast Skill**.
- The Steps for accessing the Aera Decision Cloud and creating a workspace are common across all the exercises.
- In this exercise, we are going to generate an Aera Forecast using Auto Arima, Random Forest, and Gradient Boosting modeling algorithms.
- If you are doing this exercise as part of the end-to-end development of a Demand Forecasting Skill, you will need to review the settings.
- Please continue to use **Demand Forecast Skill_Username** Workspace.
- The data in some of the Screenshots do not match the instructions and is illustrative; in such cases you are requested to follow the instructions.

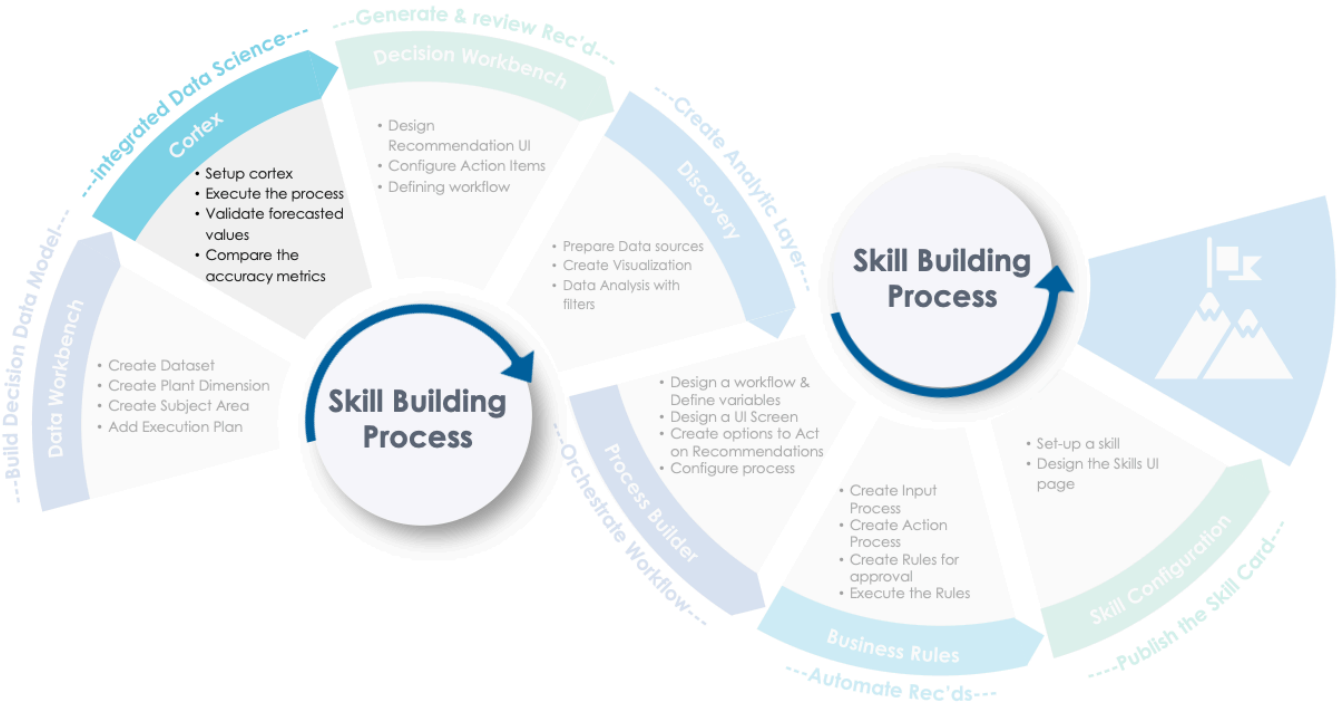
Key Takeaway

Generate demand forecast for finished products using Sales History by using a univariate model.

- Setup cortex
- Execute the process
- Cortex console and data view

Expected Results

Skill Building Process



Typical Errors

1. Process ID is not visible in the Show logs option.
    a. Check for the mail you have received.
    b. The processing of the job takes around 30 min.

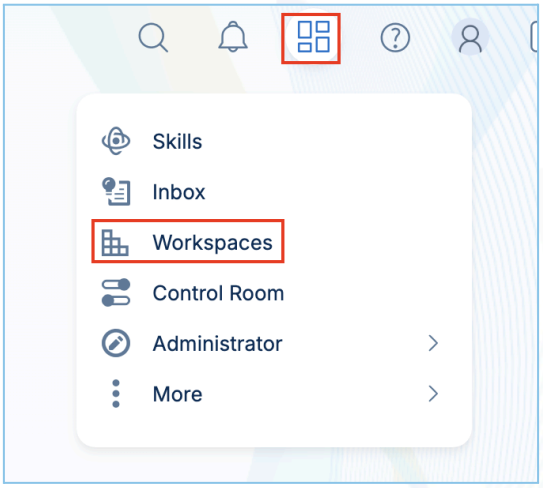
Tips and Tricks

1. Depending upon the number of grains involved, the execution time of the process varies.
2. Ensure selection and mapping of correct parameters.

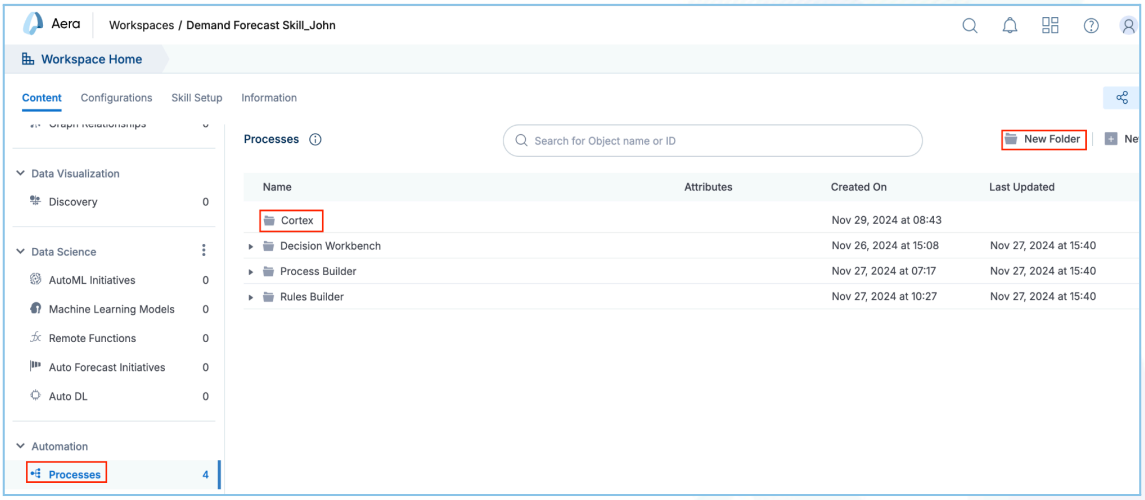
Action/ Steps

Setup Cortex

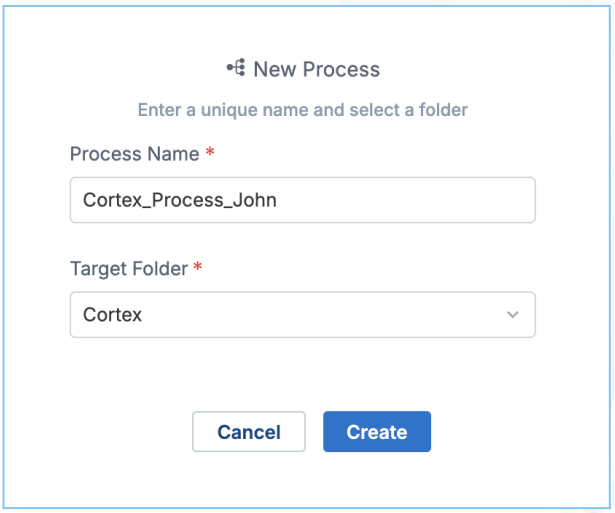
1. Click the **Aera Menu** icon on the Aera Decision Cloud and then click the **Workspaces**.



2. Navigate to the **Demand Forecast Skill_<Username>** you previously created.
3. From the **Workspace Home**, go to **Processes** and create a new folder named **Cortex.**

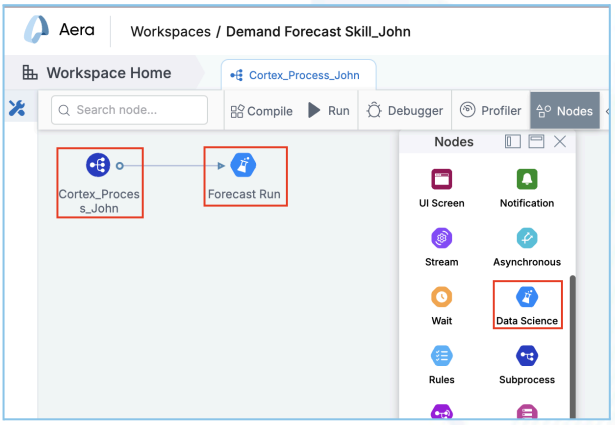


4. Right-click the folder created above and select **New Process**.
5. Enter the name **Cortex_Process_<Username>**, select the folder **Cortex,** and click **Create**.

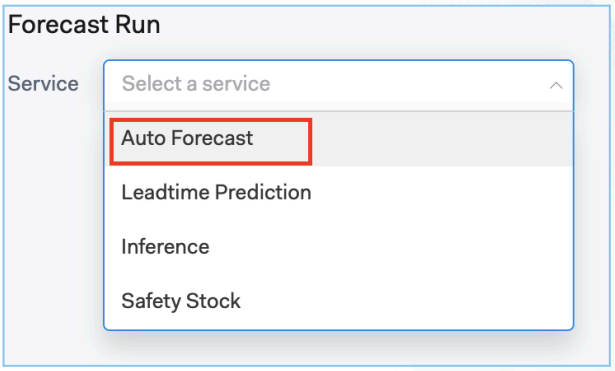


6. The process tab displays the process created.

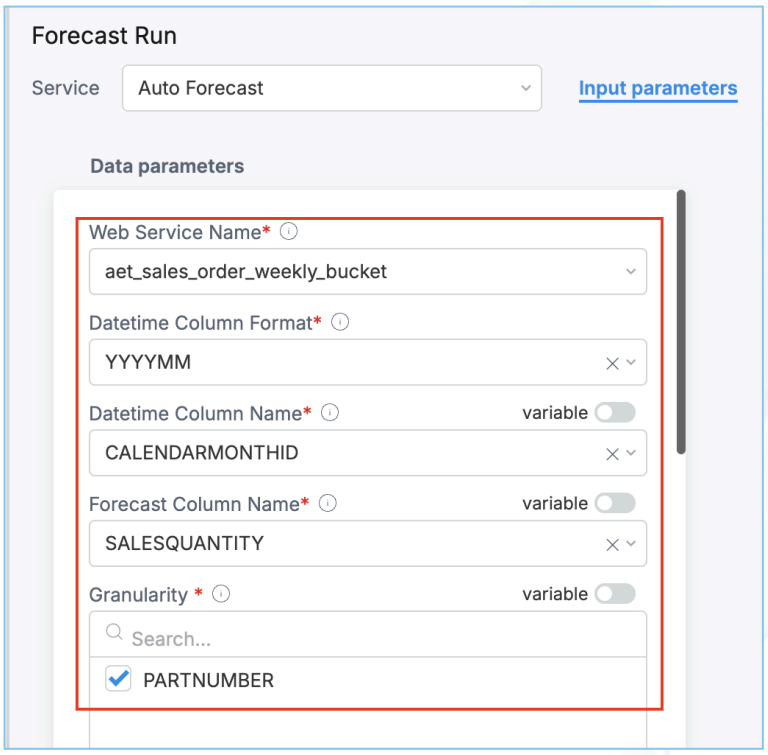
7. Drag **Data Science** node onto the **Cortex_Process_<Username>** node and name it **Forecast Run.**



8. Double-click the node **Forecast Run** to open it.
9. Choose the service name **Auto Forecast** from the drop-down menu.



10. In the **Data Parameters**, enter the following values.



Web Service Name: aet_sales_order_weekly_bucket

DateTime Column Format –Select **YYYYMM**.

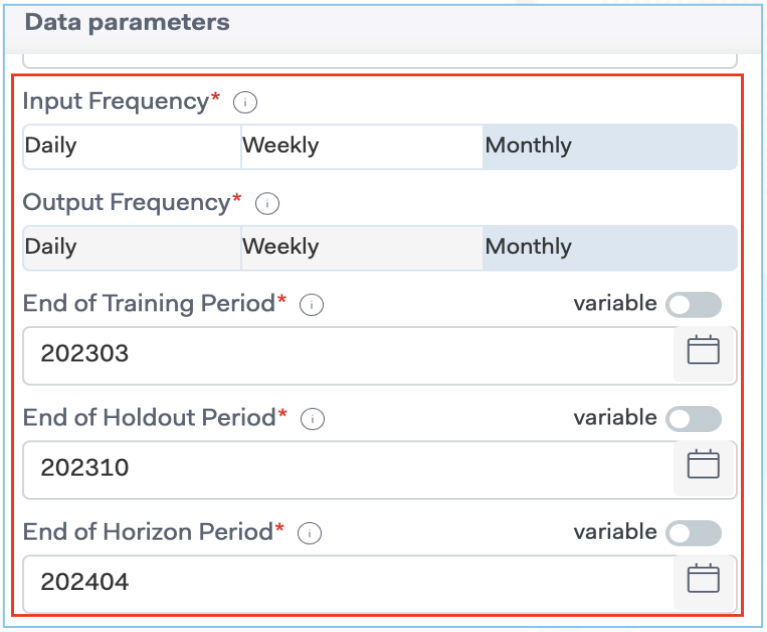
Datetime Column Name –Datetime column name used in the input data. Select **CALENDARMONTHID**.

Forecast Column Name – The value to be predicted. Select **SALESQUANTITY**.

Granularity – The granularity level at which the forecast will be run. Select **PARTNUMBER.**

Note: The Data View **AET_ Sales_order_weekly** needed for this exercise is accessible as a Web Service.

11. Scroll down the Data parameters and enter the timelines as shown.



Input/Output – frequency of forecast, Select **Monthly**

End of Training Period – The date until which the model needs to be trained. It is required for the first iteration of the forecast. Select **'202303'**

End of Holdout Period – Period until which the model needs to be tested. Select **'202310'**.

End of Horizon Period – Maximum Date till which forecast is requested. Select **'202403'**.

12. Select the below-given **Algorithm** and **Metrics.**

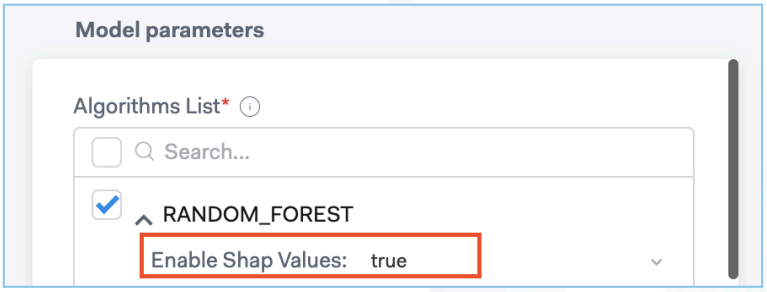
Algorithm List: 'AUTO_ARIMA,' 'GRADIENT_BOOSTING,'' RANDOM_FOREST.'

Error Metric List: 'MAPE', 'MAPEAdj'

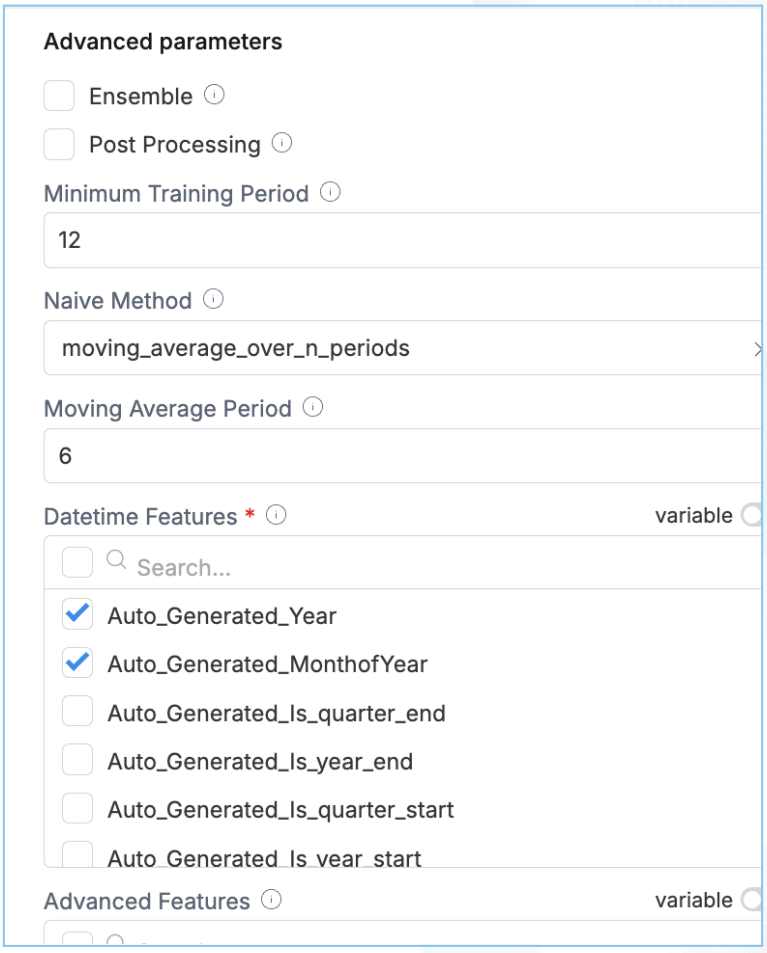
Ranking Metric: 'MAPEAdj'

Requested Ranks: '3'

13. Set the **Enable Shap Value** to **True** in case of Gradient Boosting and Random Forest Algorithm.



14. Scroll down the model parameters and provide the below values:



Minimum Training period: 12

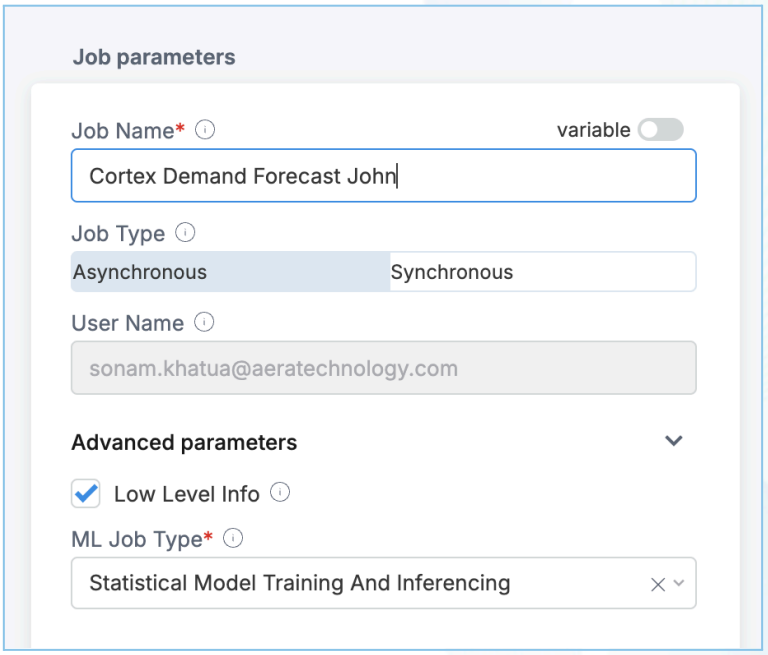
Naïve Method: moving_average_over_n_periods

Moving Average Period: 6

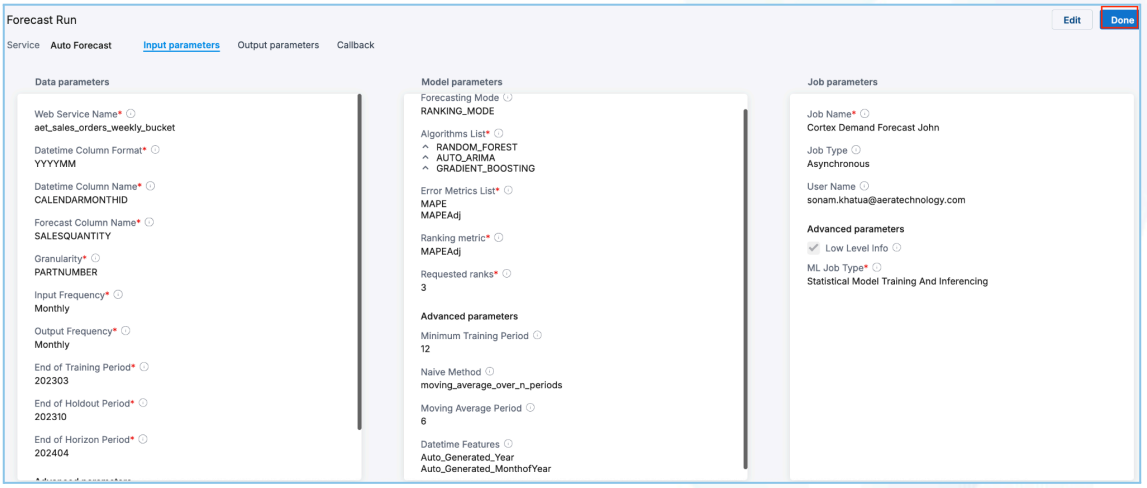
Datetime Features: Auto_Generated_Year, Auto_Generated_MonthofYear

Cortex forecasting can perform automated data quality tests, forecastability calculations, and validation of forecast output. This enables touchless forecasting skills and further automation.
Data Quality: These are preprocessing tests done on the raw sales data before forecasting. The objective is to assess the data quality and assign corresponding quality check reasons.
Forecastability: These are the preprocessing tests done on the raw sales data before forecasting. The objective is to test the forecastability of each grain.
Forecast Validation: These tests are designed to ensure a good forecast.

15. Provide the job name **Cortex Demand Forecast <Username>** in the job parameters.
16. Select the job type as **Asynchronous.**
17. Provide your **<email id>** as a username to receive the process completion notification.
18. Select the **Low level Info** to get the training period forecast as well, and choose **ML Job Type** as **Statistical Model Training And Inferencing**.



19. Click **Review**, and after reviewing, click **Done**.

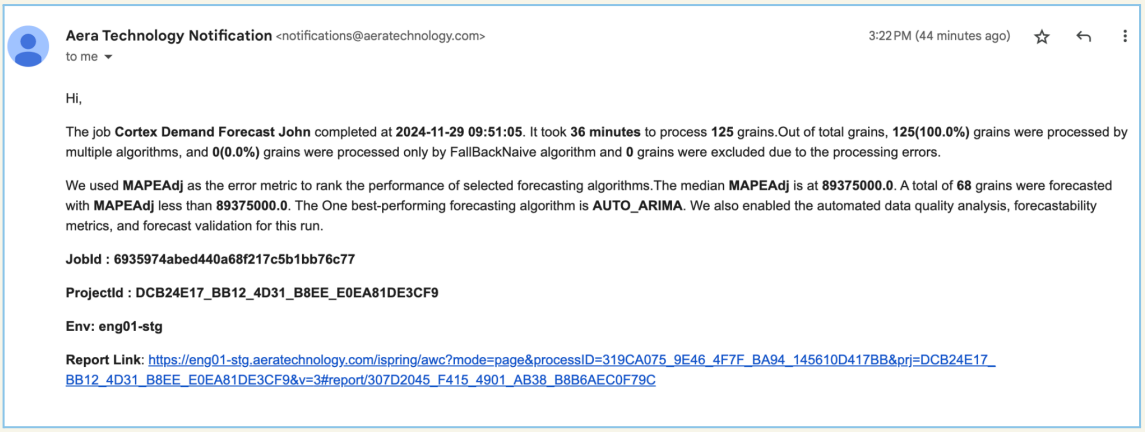


25. **Save** the Process.

Execute the Process

1. Execute the Cortex process by clicking on **Run**.

Once the process is completed, you will get a unique job ID through an email.



Aera Technology Notification <notifications@aeratechnology.com> 3:22 PM (44 minutes ago)
to me

Hi,

The job **Cortex Demand Forecast John** completed at **2024-11-29 09:51:05**. It took **36 minutes** to process **125** grains.Out of total grains, **125(100.0%)** grains were processed by multiple algorithms, and **0(0.0%)** grains were processed only by FallBackNaive algorithm and **0** grains were excluded due to the processing errors.

We used **MAPEAdj** as the error metric to rank the performance of selected forecasting algorithms.The median **MAPEAdj** is at **89375000.0**. A total of **68** grains were forecasted with **MAPEAdj** less than **89375000.0**. The One best-performing forecasting algorithm is **AUTO_ARIMA**. We also enabled the automated data quality analysis, forecastability metrics, and forecast validation for this run.

JobId : 6935974abed440a68f217c5b1bb76c77

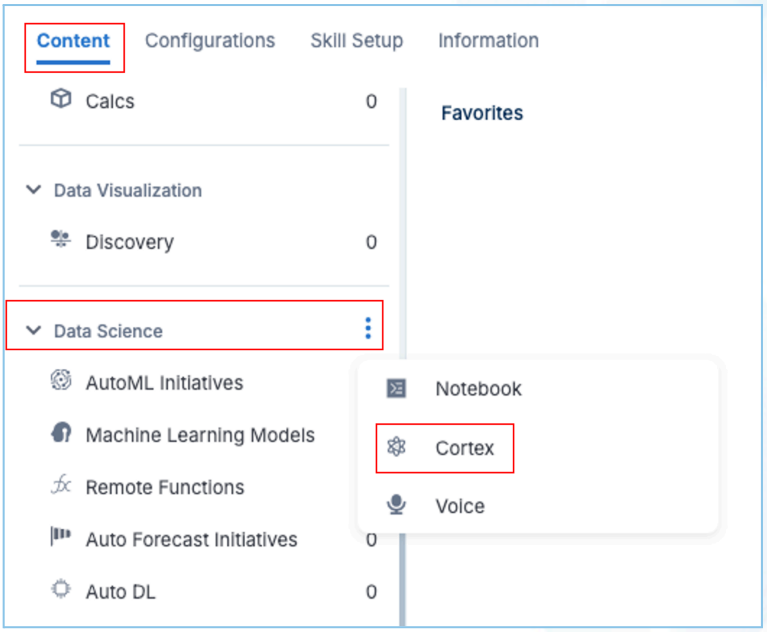
ProjectId : DCB24E17_BB12_4D31_B8EE_E0EA81DE3CF9

Env: eng01-stg

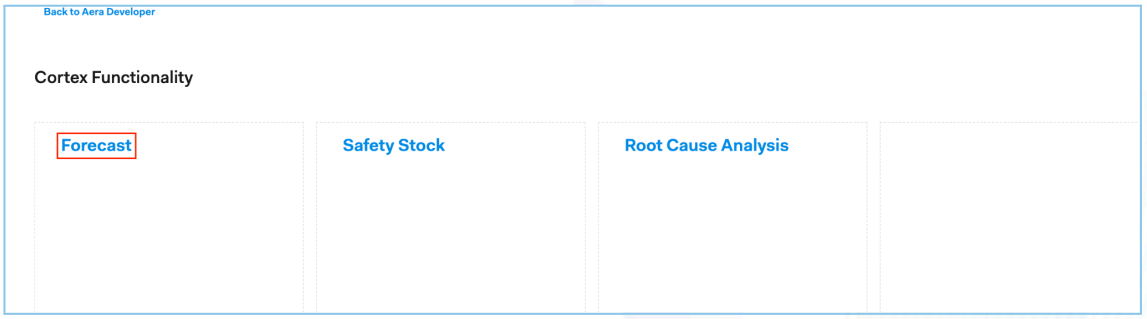
Report Link: https://eng01-stg.aeratechnology.com/ispring/awc?mode=page&processID=319CA075_9E46_4F7F_BA94_145610D417BB&prj=DCB24E17_BB12_4D31_B8EE_E0EA81DE3CF9&v=3#report/307D2045_F415_4901_AB38_B8B6AEC0F79C

Cortex Console

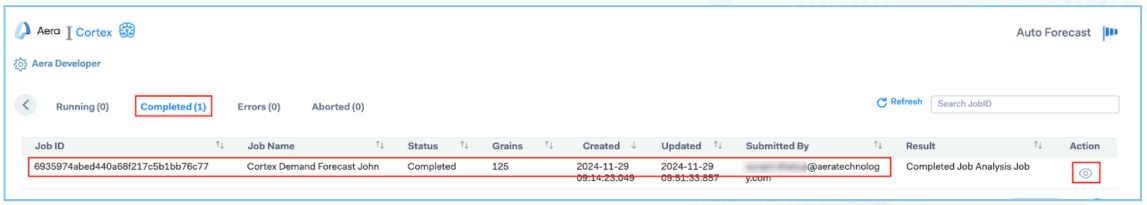
1. The cortex console is used to evaluate the model results and operationalize the model output quickly.
2. From Content, go to the Data Science label and click the three-dot icon to select **Cortex**.



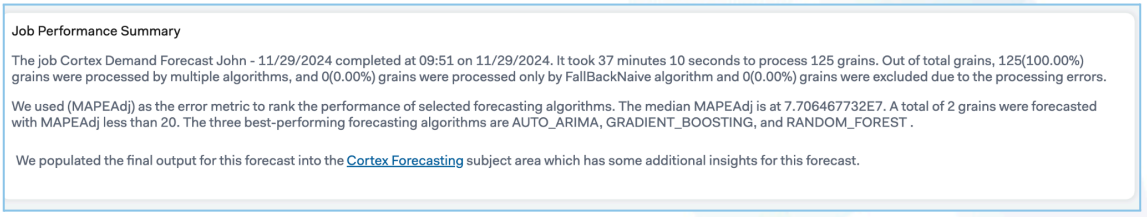
3. Select **Forecast** on the cortex functionality page to see all the cortex job details.

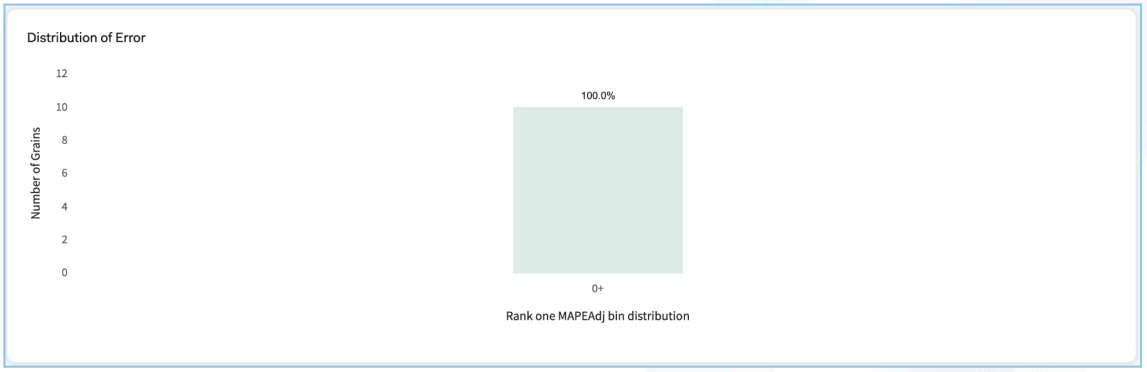


4. All the cortex jobs executed are displayed.
5. Go to **Completed** tab. Look for your job ID and click the **View Details** tab.

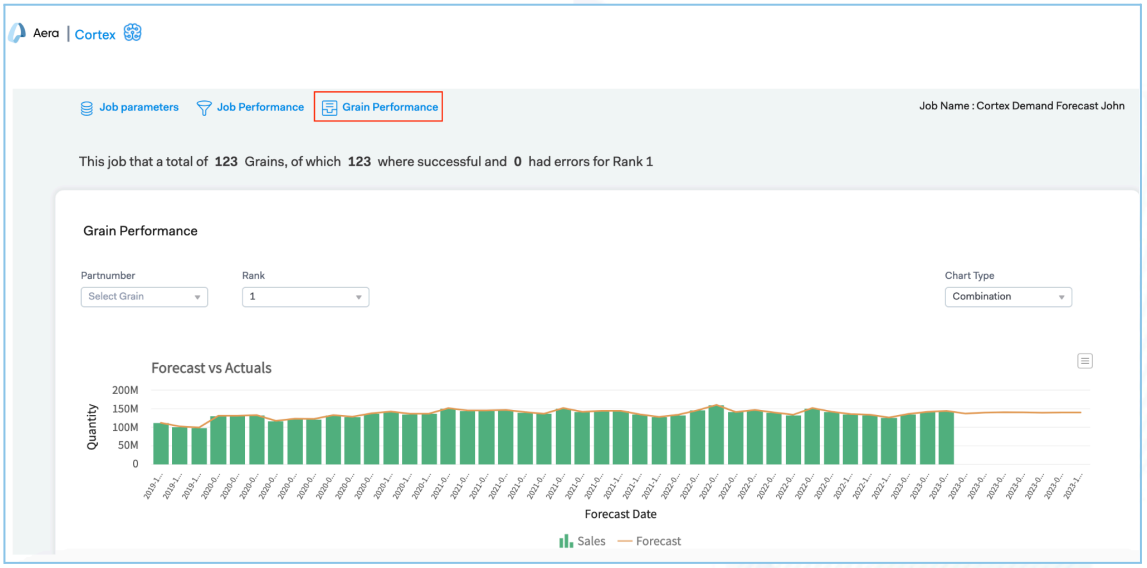


6. The job performance summary and the distribution of forecasting errors on the training data are displayed.



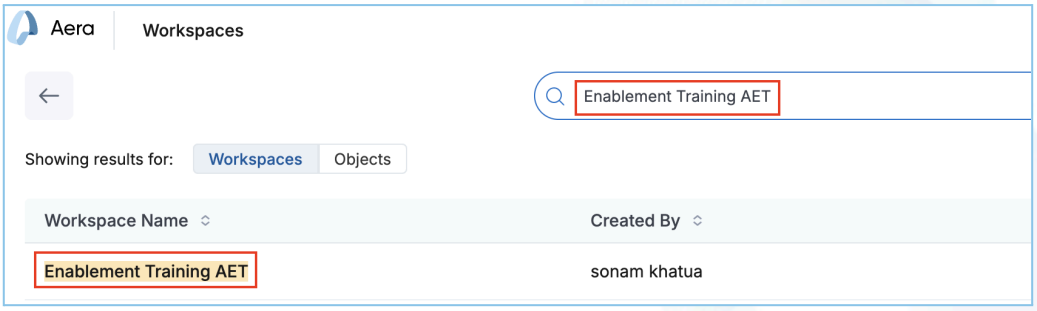


7. Click on **Grain Performance** to see the **Forecast** Vs **Actuals Chart**

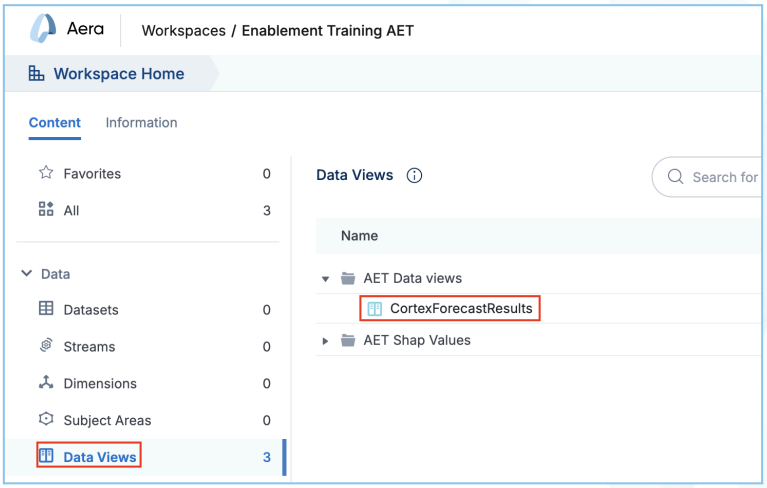


Cortex Data View

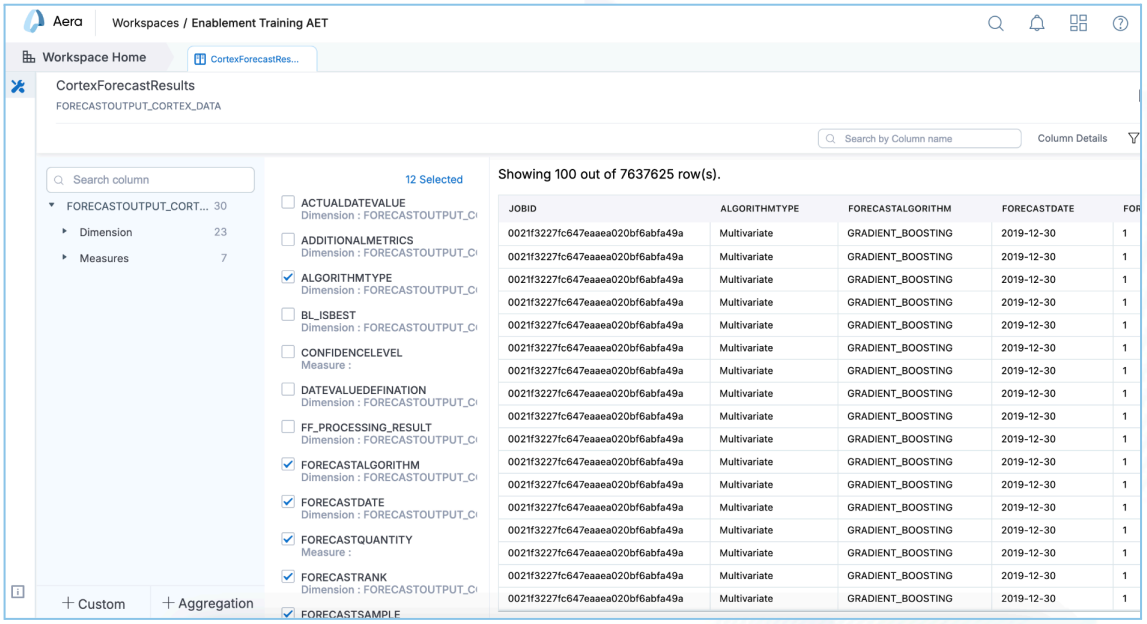
1. From the Workspace page, search for **Enablement Training AET** workspace.



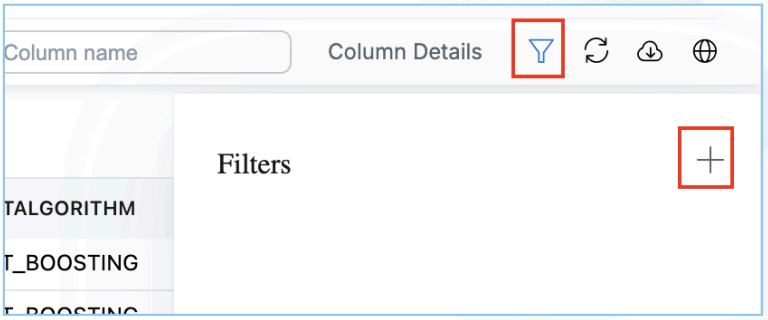
2. Open the Workspace, go to **Data Views**, and open the **CortexForecastResults** data view within the **AET Data views** folder to see the Forecast Output data.

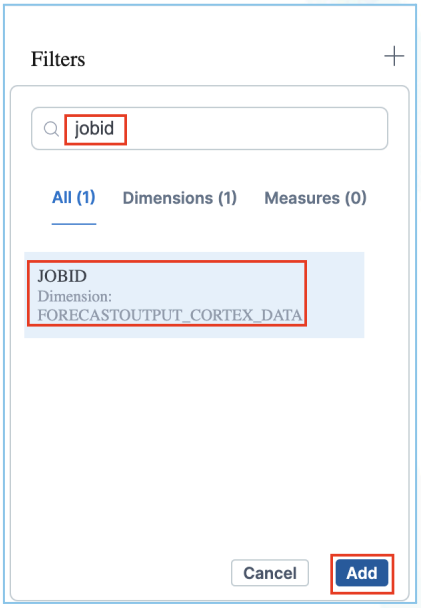


3. Click on the cortex data option at the bottom to view the data.

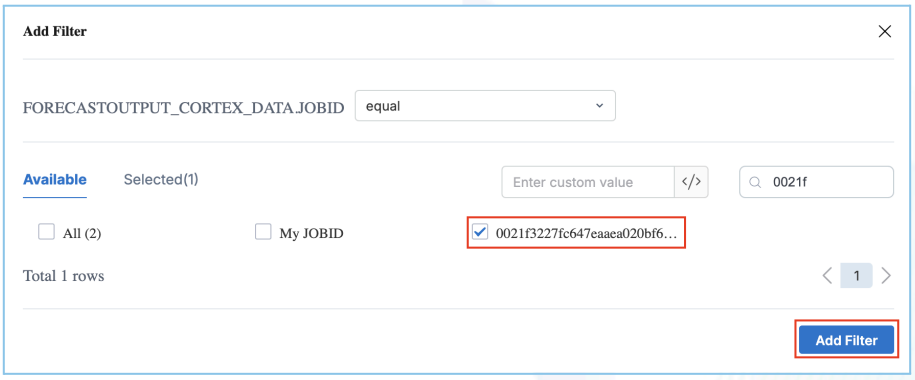


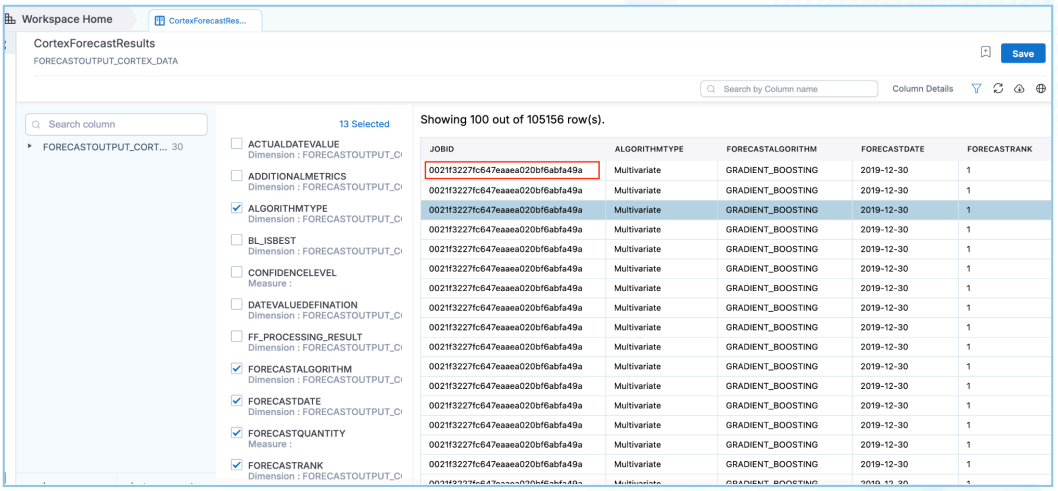
4. Add a new filter for the **JobId**.



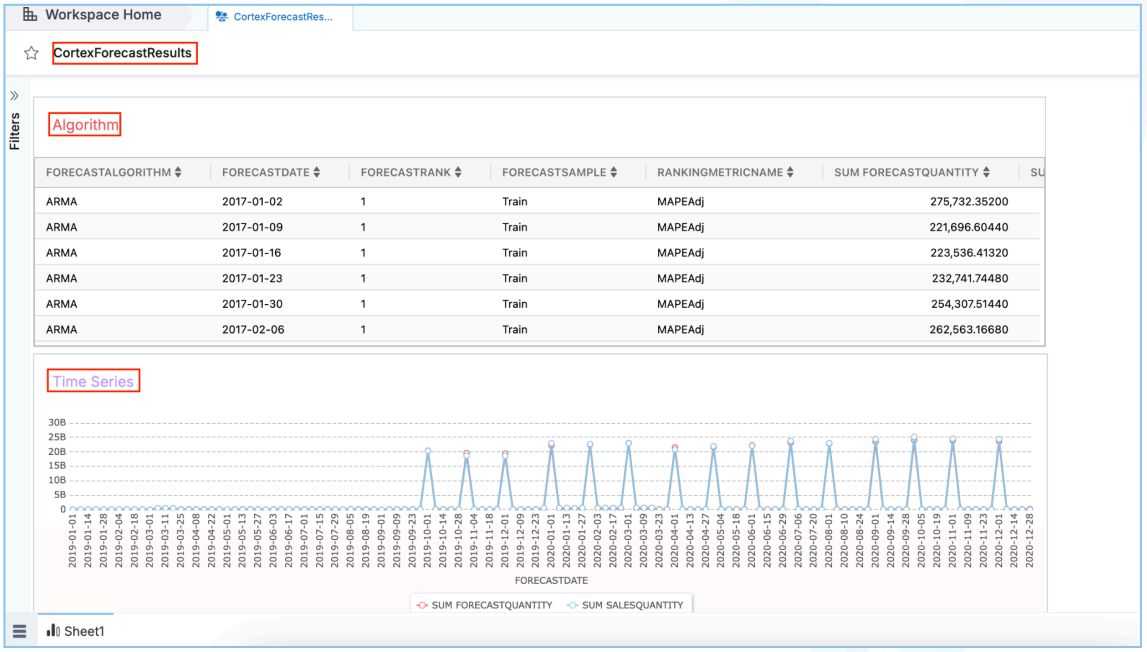


5. Select the filter, ensure to unselect all filters, choose the **equal** operator, provide your job ID, and click **Add**.

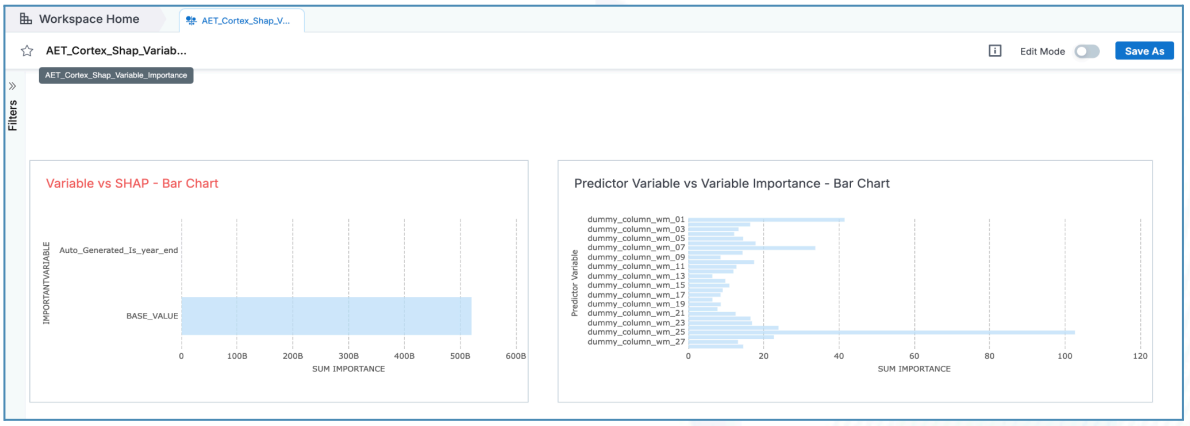




6. From Workspace Home, go to **Discovery** and open **CortexForecastResults**. The **Algorithm** visual will display the algorithms used.
7. The **Time Series** visual will show the Forecast vs. Sales analysis.



8. Similarly, open the **AET_Cortex_Shap_Variable_Importance** discovery to see the comparison between the Variable with Shap and the Predictor variable with variable importance.



SUMMARY

In this hands-on exercise, you have:

- Created a process named **Cortex Process_<Username>** and configured the Data Science node using the **Auto Forecast** service with pre-existing web service **aet_sales_order_weekly_bucket**.
- Reviewed the job performance using the cortex console and evaluated the model performance.
- Reviewed the job grains using data views and analyzed the charts in discoveries.