

Building a Demand Forecast | Cortex

INTRODUCTION

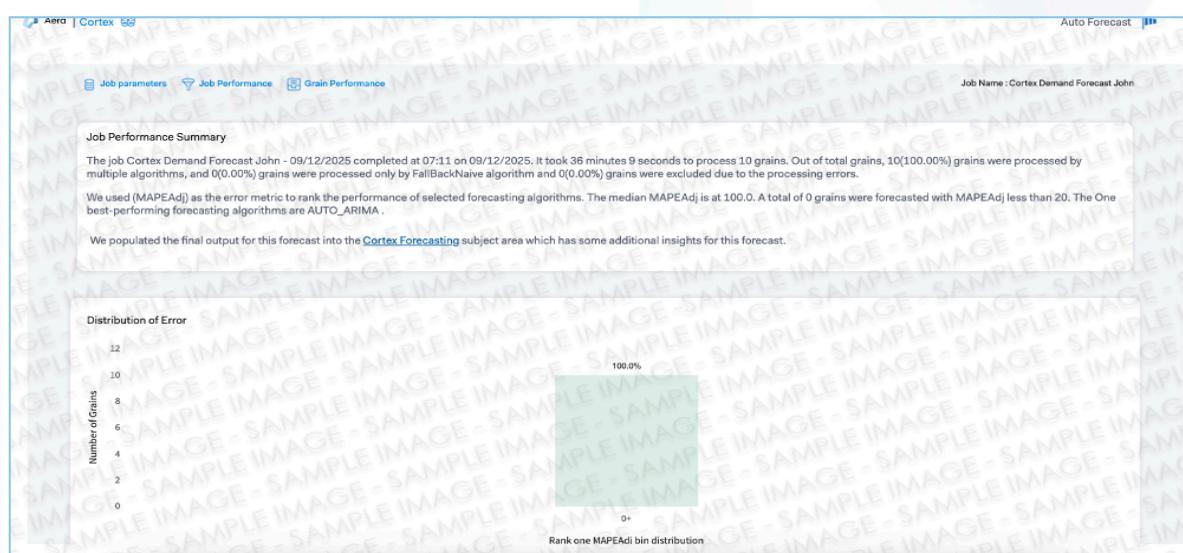
- This Hands-on Exercise is a part of **Building A Demand Forecast Skill**.
- The Steps for accessing the Aera Decision Cloud and creating a workspace are common across all the exercises.
- In this exercise, we are going to generate an Aera Forecast using Auto Arima, Random Forest, and Gradient Boosting 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.

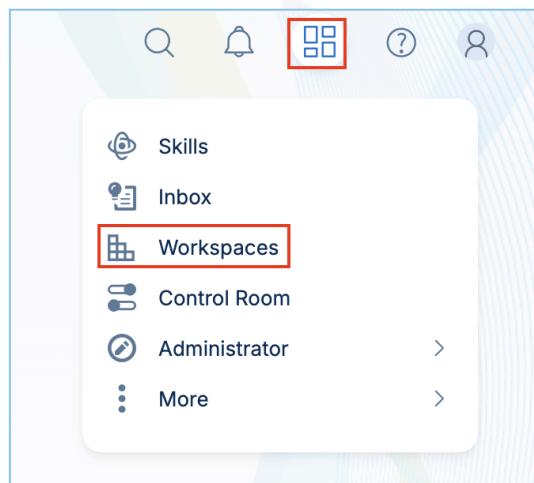
TIPS AND TRICKS

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

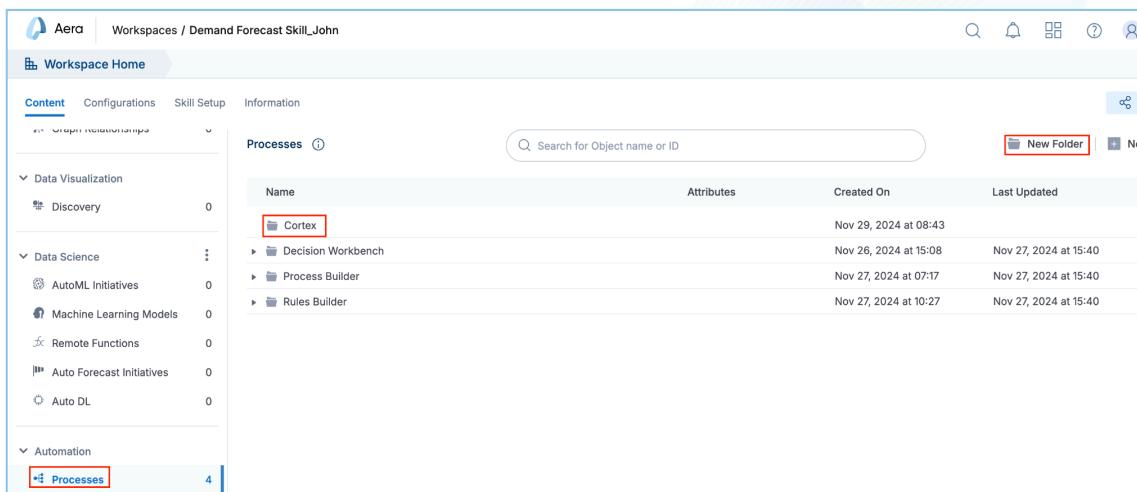
ACTION/ STEPS

Setup Cortex

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

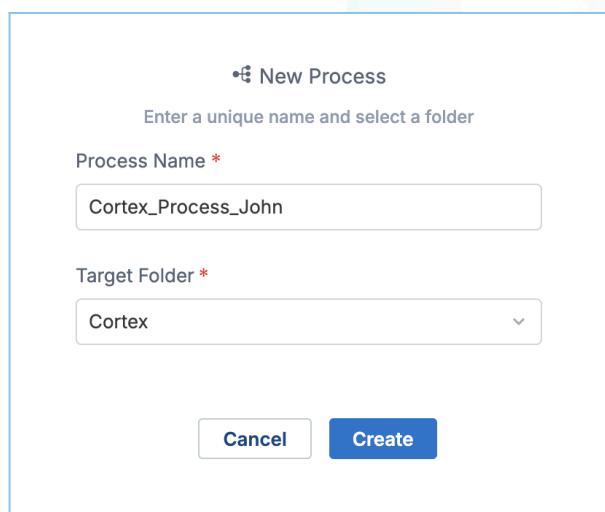


2. Navigate to the **Demand Forecast Skill_<Username>** you previously created.
3. From the **Workspace Home**, go to **Processes** and create a new folder named **Cortex**.



Name	Attributes	Created On	Last Updated
Cortex		Nov 29, 2024 at 08:43	
Decision Workbench		Nov 26, 2024 at 15:08	Nov 27, 2024 at 15:40
Process Builder		Nov 27, 2024 at 07:17	Nov 27, 2024 at 15:40
Rules Builder		Nov 27, 2024 at 10:27	Nov 27, 2024 at 15:40

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**.



New Process

Enter a unique name and select a folder

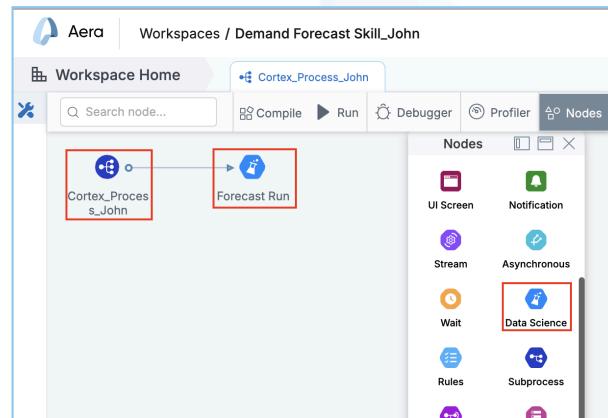
Process Name *

Target Folder *

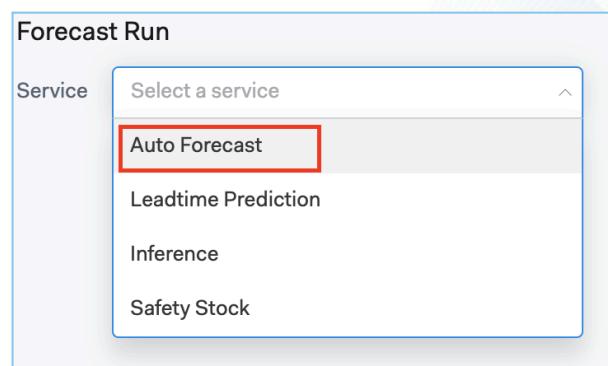
Create

6. The process tab displays the process created.

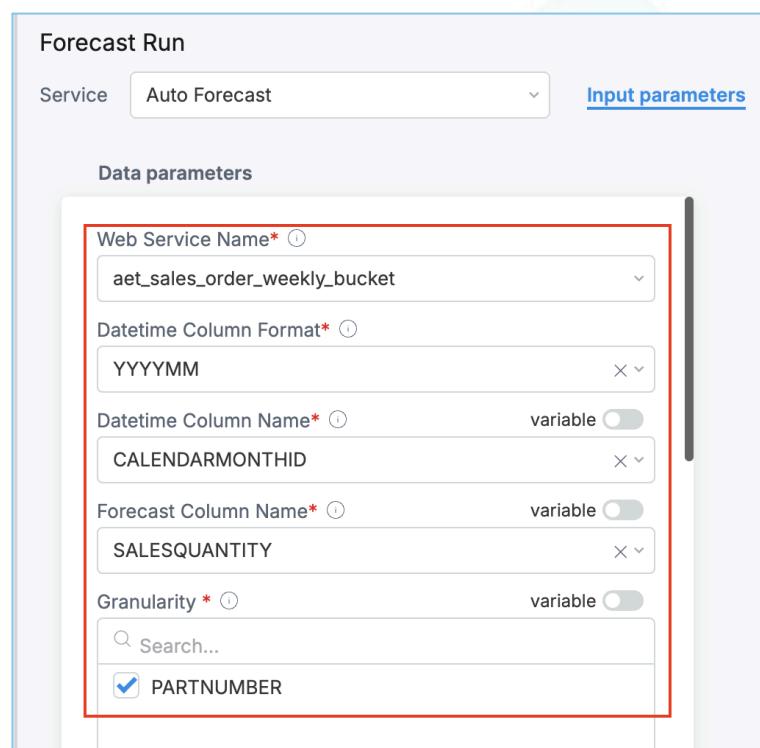
7. Drag **Data Science** node onto the **Cortex_Process_<Username>** node and name it **Forecast Run**.



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.



The screenshot shows the 'Forecast Run' dialog box with the 'Input parameters' tab selected. Under the 'Data parameters' section, several fields are configured:

- Web Service Name***: aet_sales_order_weekly_bucket
- Datetime Column Format***: YYYYMM
- Datetime Column Name***: CALENDARMONTHID (with 'variable' toggle off)
- Forecast Column Name***: SALESQUANTITY (with 'variable' toggle off)
- Granularity ***: PARTNUMBER (with 'variable' toggle off)

The entire 'Data parameters' section is highlighted with a large red box.

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.

The screenshot shows the 'Data parameters' configuration window. A red box highlights the timeline settings. The 'Input Frequency' dropdown is set to 'Monthly'. The 'Output Frequency' dropdown is also set to 'Monthly'. Below these are three date inputs: 'End of Training Period' is set to '202303' with a variable toggle switch off; 'End of Holdout Period' is set to '202310' with a variable toggle switch off; and 'End of Horizon Period' is set to '202404' with a variable toggle switch off. Each date input has a calendar icon to its right.

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.

The screenshot shows the 'Model parameters' section. Under 'Algorithms List*', 'RANDOM_FOREST' is selected. A red box highlights the 'Enable Shap Values: true' checkbox.

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

The screenshot shows the 'Advanced parameters' section. It includes fields for 'Minimum Training Period' (set to 12), 'Naïve Method' (set to 'moving_average_over_n_periods'), 'Moving Average Period' (set to 6), and a list of 'Datetime Features' including 'Auto_Generated_Year' and 'Auto_Generated_MonthofYear' (both checked). There is also a 'variable' dropdown next to the feature list.

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**.

Job parameters

Job Name*	<input type="text" value="Cortex Demand Forecast John"/> variable <input checked="" type="checkbox"/>
Job Type	<input checked="" type="radio"/> Asynchronous <input type="radio"/> Synchronous
User Name	<input type="text" value="sonam.khatua@aerotechnology.com"/>

Advanced parameters

<input checked="" type="checkbox"/> Low Level Info	
ML Job Type*	<input type="text" value="Statistical Model Training And Inferencing"/> <input type="button" value="X"/> <input type="button" value="▼"/>

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

Forecast Run

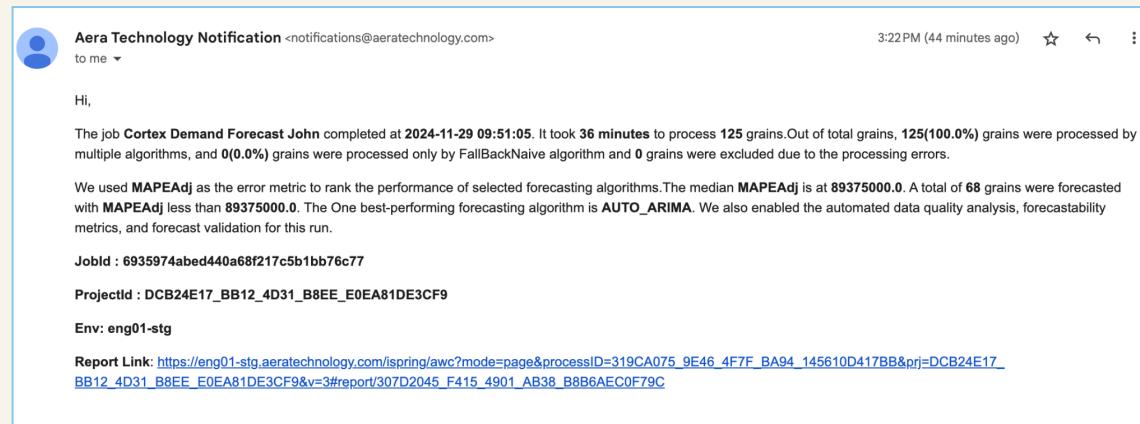
Service	Auto Forecast	Input parameters	Output parameters	Callback
Data parameters		Model parameters	Job parameters	
Web Service Name* <input type="text" value="aet_sales_orders_weekly_bucket"/>		Forecasting Mode <input type="radio"/> RANKING_MODE	Job Name* <input type="text" value="Cortex Demand Forecast John"/>	
Datetime Column Format* <input type="text" value="YYYYMM"/>		Algorithms List* <input type="radio"/> RANDOM_FOREST	Job Type <input type="radio"/> Asynchronous	
Datetime Column Name* <input type="text" value="CALENDARMONTHID"/>		<input type="radio"/> AUTO_ANIMA	User Name <input type="text" value="sonam.khatua@aerotechnology.com"/>	
Forecast Column Name* <input type="text" value="SALESQUANTITY"/>		<input type="radio"/> GRADIENT_BOOSTING		
Granularity* <input type="text" value="PARTNUMBER"/>				
Input Frequency* <input type="text" value="Monthly"/>				
Output Frequency* <input type="text" value="Monthly"/>				
End of Training Period* <input type="text" value="202303"/>				
End of Holdout Period* <input type="text" value="202310"/>				
End of Horizon Period* <input type="text" value="202404"/>				
		Advanced parameters		
		Minimum Training Period <input type="radio"/> 12		
		Naive Method <input type="radio"/> moving_average_over_n_periods		
		Moving Average Period <input type="radio"/> 6		
		Datetime Features <input type="radio"/> Auto_Generated_Year		
		Auto_Generated_MonthofYear		

25. **Save** the Process.

Execute the Process

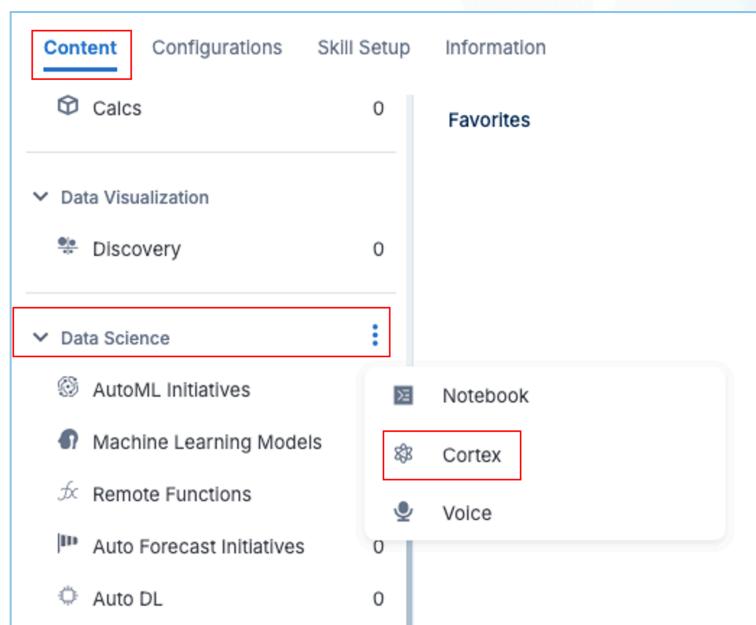
1. Execute the Cortex process by clicking on **Run**.

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



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**.



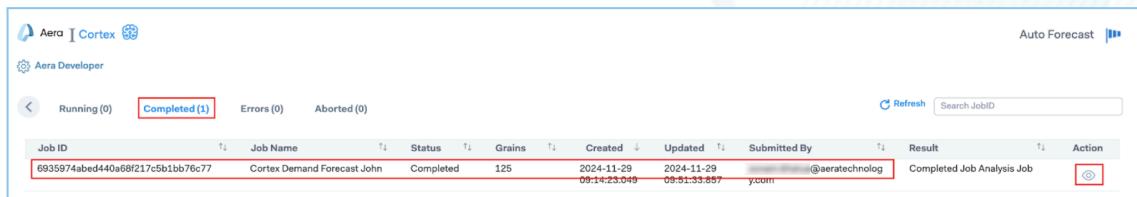
3. Select **Forecast** on the cortex functionality page to see all the cortex job details.

[Back to Aera Developer](#)

Cortex Functionality

Forecast	Safety Stock	Root Cause Analysis	
-----------------	---------------------	----------------------------	--

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



The screenshot shows the Cortex interface with the 'Completed' tab selected. There is one job listed:

Job ID	Job Name	Status	Grains	Created	Updated	Submitted By	Result	Action
6935974abed440a68f217c5b1bb76c77	Cortex Demand Forecast John	Completed	125	2024-11-29 09:14:23.049	2024-11-29 09:51:33.857	@aeratechnolog.y.com	Completed Job Analysis Job	

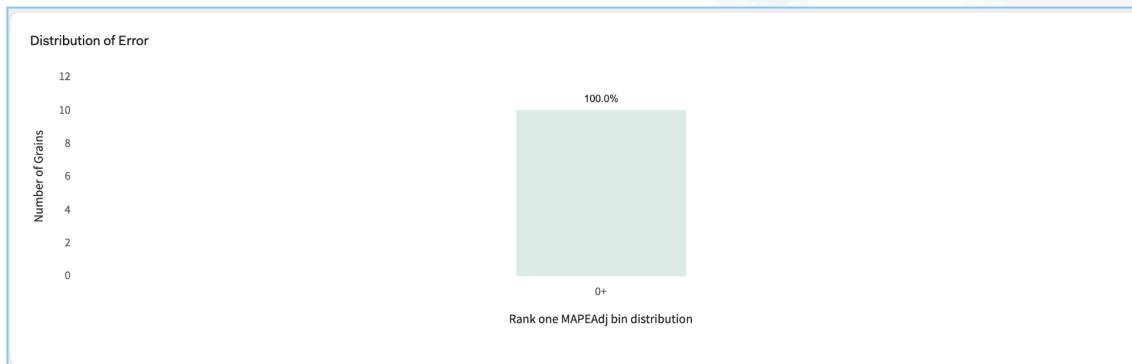
6. The job performance summary and the distribution of forecasting errors on the training data are displayed.

Job Performance Summary

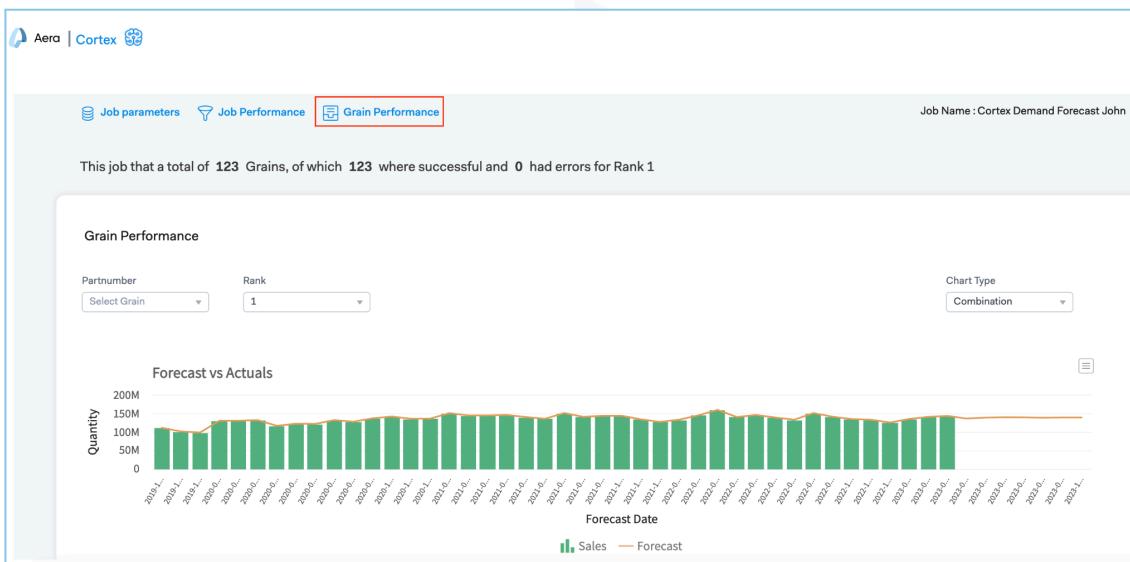
The job Cortex Demand Forecast John - 11/29/2024 completed at 09:51 on 11/29/2024. It took 37 minutes 10 seconds to process 125 grains. Out of total grains, 125(100.00%) grains were processed by multiple algorithms, and 0(0.00%) grains were processed only by FallBackNaive algorithm and 0(0.00%) grains 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 7.706467732E7. A total of 2 grains were forecasted with MAPEAdj less than 20. The three best-performing forecasting algorithms are AUTO_ARIMA, GRADIENT_BOOSTING, and RANDOM_FOREST .

We populated the final output for this forecast into the [Cortex Forecasting](#) subject area which has some additional insights for this forecast.

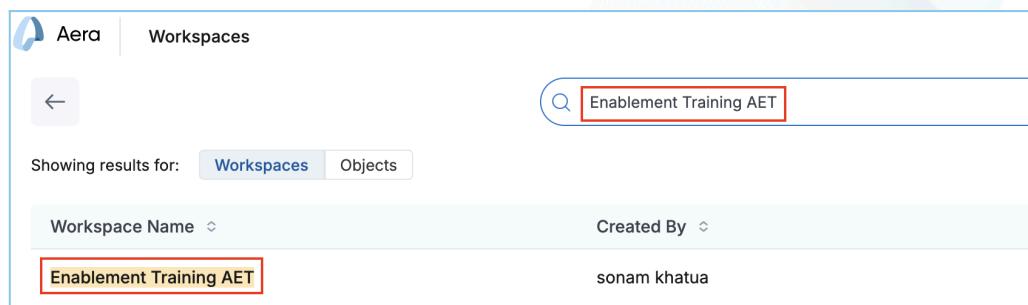


7. Click on **Grain Performance** to see the **Forecast Vs Actuals Chart**



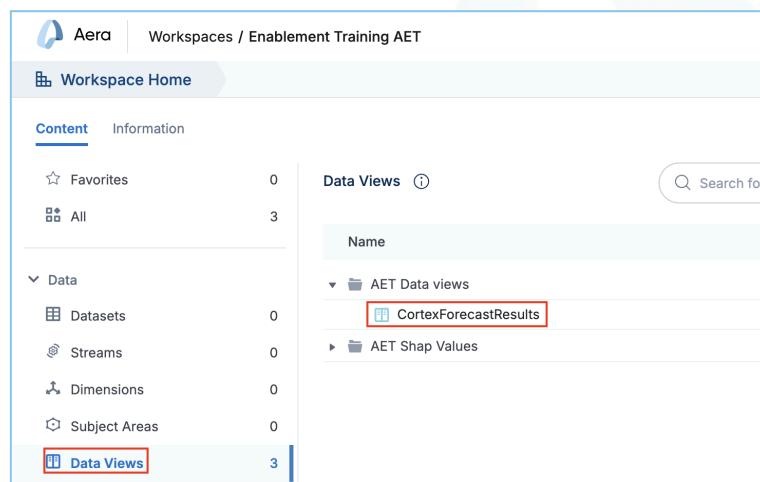
Cortex Data View

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



Workspace Name	Created By
Enablement Training AET	sonam khatua

- 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.



- CortexForecastResults**

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

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

Column name	Column Details
	   
TALGORITHM	 
T_BOOSTING	
T_BOOSTING	

Filters

All (1) Dimensions (1) Measures (0)

JOBID

Dimension:

FORECASTOUTPUT_Cortex_Data

Cancel

Add

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

Add Filter

FORECASTOUTPUT_CORTEX_DATA.JOBID

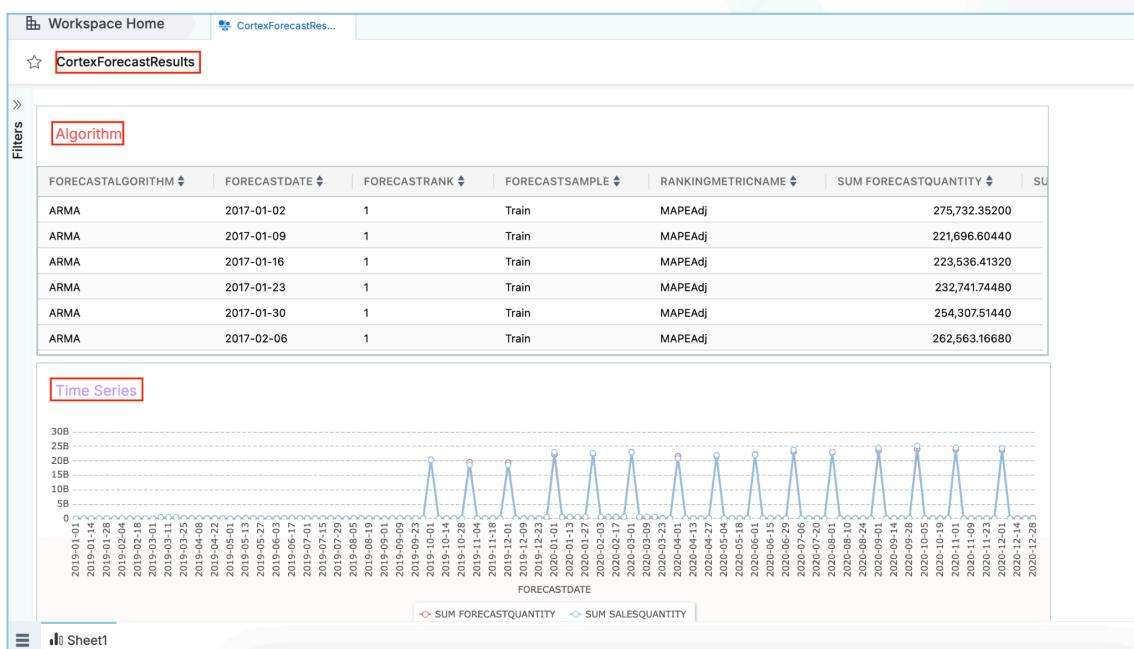
Available	Selected(1)
<input type="checkbox"/> All (2)	<input type="checkbox"/> My JOBID
	<input checked="" type="checkbox"/> 0021f3227fc647eaaea020bf6...

Enter custom value </>

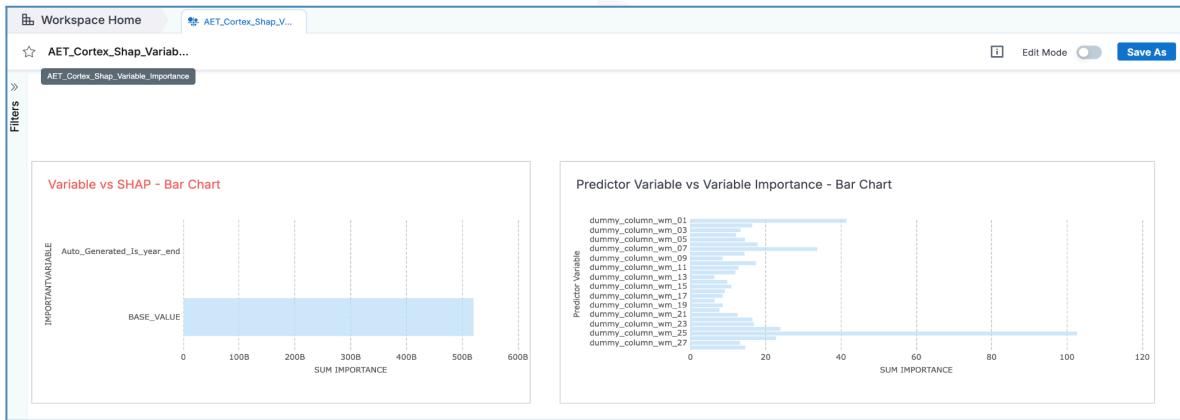
Total 1 rows < 1 >

Add Filter

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



- 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.