



الهيئة السعودية للمياه
Saudi Water Authority

Costing Consumption Forecast



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Costing Consumption



Overview

To analyze the historical cost consumption of each department within the Saudi Water Authority (SWA) and leverage predictive analytics techniques to forecast future cost trends. This enables data-driven budget planning and resource allocation.

Objectives

- Effective Budget Planning
- Ensure Cost Control
- Find Cost Leakage

Approach

- Data collection and cleansing
- Algorithm selection
- Training and validating the AI model

Outcome

Forecasted future cost for each department

Highlights of the Strategy



Data Preparing and cleaning

Renaming data elements into a proper naming convention, removing outlier.



Data structuring

Restructuring the data into groups based on desired forecasting combinations (Plant_ID, Phase, Technology, Cost_Category_ID).



Model Training

Teaching the AI model how to make predictions by giving it examples, letting it make predictions and compare it with to the correct answers.



Deployment

Deploy the AI model to forecast future cost values for each combination.

AI Model Selection & Training

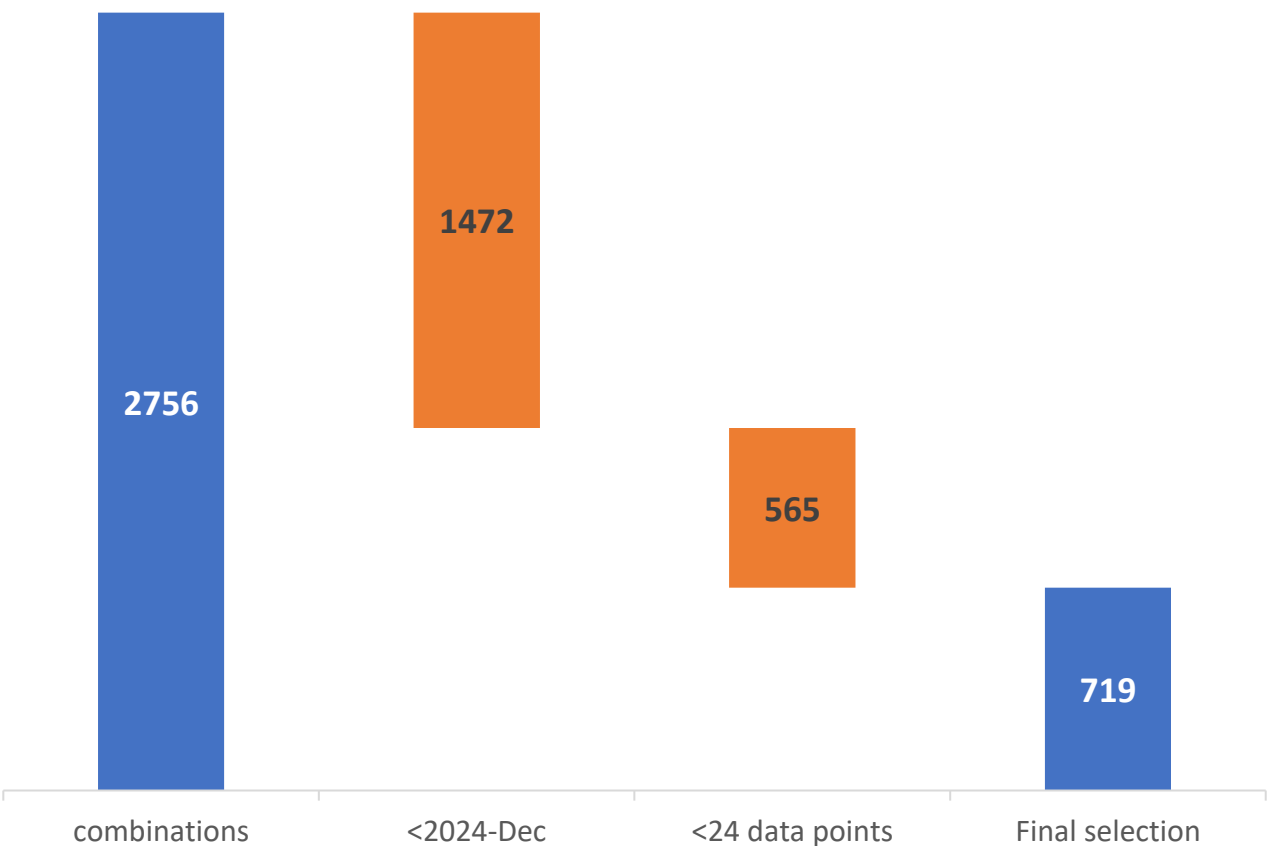
Combinations Selection

- Total of **2,756** combinations were created (Plant_ID, Phase, Technology, Cost_Category_ID).
- **1,472** combinations were removed due to not been used since December 2024.
- **565** combinations were removed due to low number of data points <24.
- **719** combinations were selected for training the model.

Algorithm Selection

- 10 Algorithm were used to train the AI model.
- Simple Feed Forward Neural Network had the lowest absolute mean error (0.239) and was selected as champion model.

Combinations Selection Waterfall



AI Model Training

Forecast Log_Cost_sum (Time series forecast) ▾

DESIGN

RESULT

SAVED

TRAIN

ACTIONS ▾

Search...

Filter ▾

Metric: MSE ▾



SESSIONS

MODELS

TABLE

Previously trained

SESSION 1			
☐	Trivial identity (s1)	0.359	☆
☐	Seasonal naive (s1)	0.617	☆
☐	AutoARIMA (s1)		
☐	Seasonal trend (s1)	0.564	☆
☐	Prophet (s1)	0.932	☆
☐	NPTS (s1)	0.578	☆
☒	Simple Feed Forw...	0.239	★
☐	DeepAR (s1)	0.324	☆
☐	Transformer (s1)	0.801	☆
☐	MQ-CNN (s1)		

SESSION 1

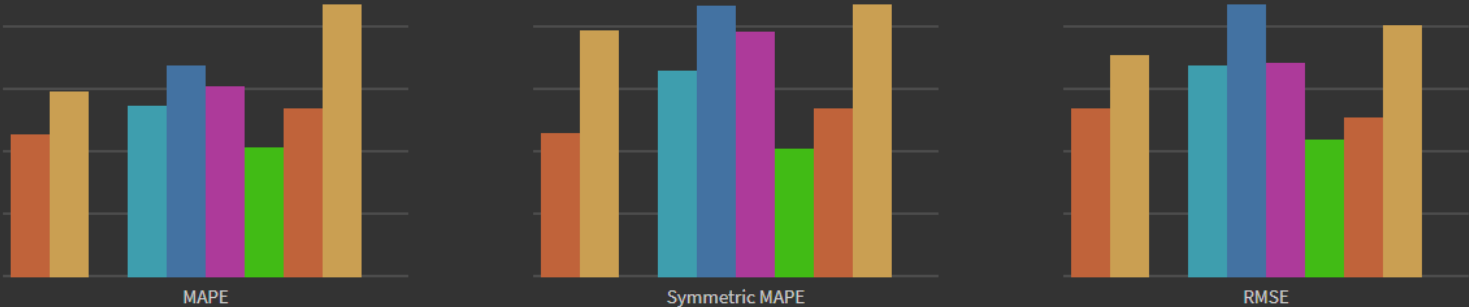
Started 2025-05-20 at 14:34, ended 2025-05-20 at 14:36

10 models

3 / 6 features ▾

Display: metrics | [hyperparameter search](#)

Performance metrics (3) ▾



Simple Feed Forward (s1)

0.239

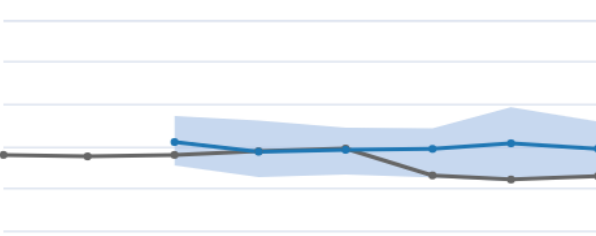
✓ Done 1 day ago (2025-05-20 14:27:48)

★ ⋮

Learning rate 0.01
Output distribution StudentOutput
Batch normalization true
Mean scaling true
Hidden layer sizes [40, 40]
Epochs 10

Model_id: 2000|PHASE3|MSF|003

[See more](#)



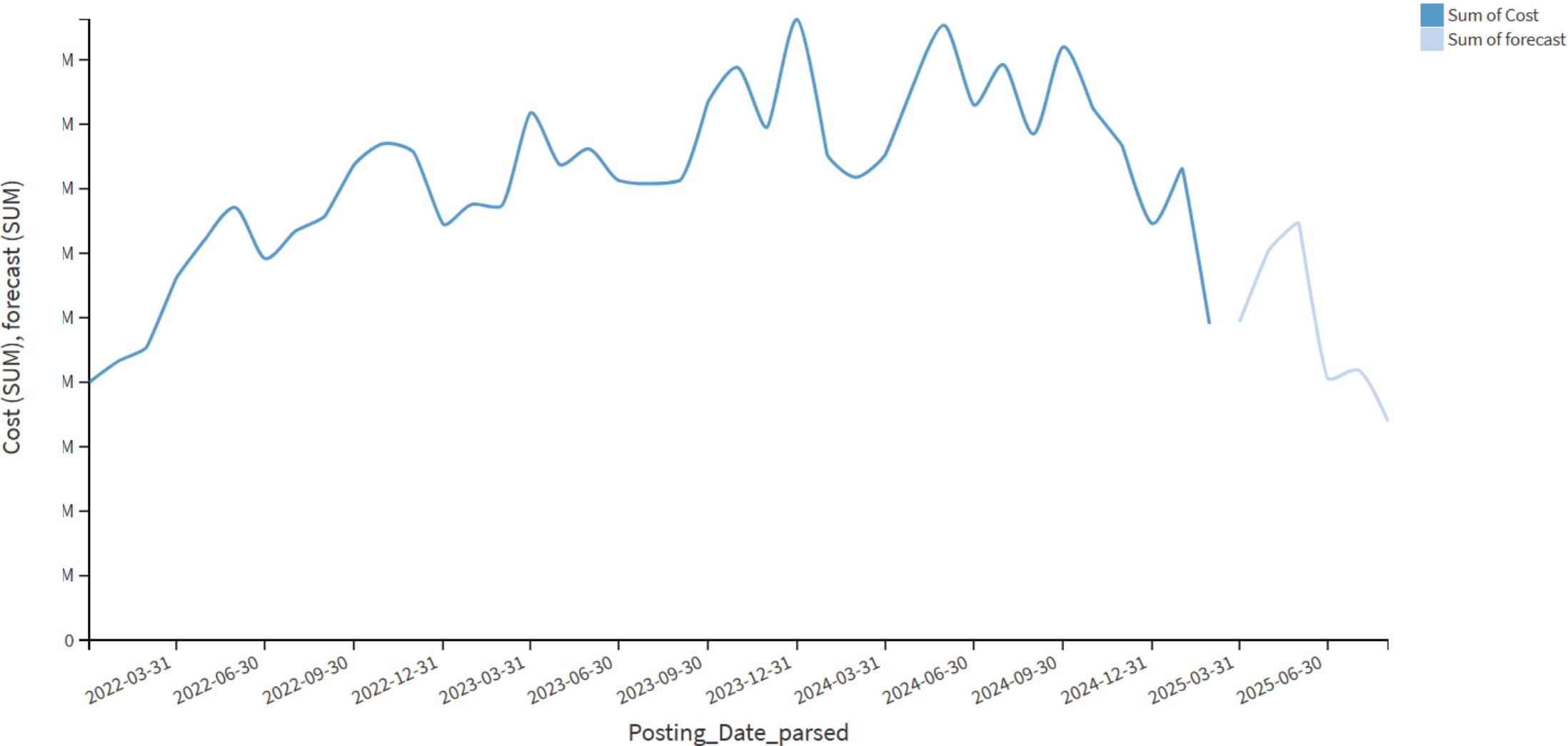
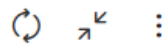
Train set 26204 rows
Train time one minute and 5 seconds

Forecasting result

Sum of Cost by Posting_Date_parsed

30753 / 34553 records

Run on DSS



Next steps

- Assess the result of the model with Costing Department Team.
- Based on the feedback we can add the forecasting result to the locker dashboard.



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Thank you



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Appendix.

Modeling Flow (Using Dataiku)

