Energy Efficiency Recommendations

By Aishani Singh

What is RapidMiner?

RapidMiner by Altair is a powerful data science platform used for tasks such as data preparation, text mining, predictive analytics, and machine learning. It enables users to build and deploy models with minimal coding through its visual workflow interface, making it accessible for both beginners and experts in data science.

Energy Efficiency Recommendations

- Building an Energy Efficiency Recommender System using a dataset from Kaggle. The objective is to optimize energy consumption in residential buildings, specifically focusing on heating and cooling loads, using available data on energy usage patterns. We aim to develop a system that analyzes historical data to identify patterns and trends in heating and cooling consumption, allowing for the implementation of targeted energy-saving actions and recommendations.

- link from kaggle of dataset
- https://www.kaggle.com/code/kehindebayode/energy-efficiency-model-for-residential-building/input?select=ENB2012_data.csv

About The Analysis

RapidMiner Features:

- GUI: RapidMiner's graphical user interface is user-friendly and helps streamline the data analysis process.
- Drag and Drop: The drag-and-drop feature makes it easier for data analysts to build workflows without extensive coding.
- Various Algorithms: RapidMiner provides a wide range of methods and algorithms for predictive modeling.

Methods to Build the Model:

- Automodel: This feature automatically selects and applies the best model for your data based on various criteria.
- Process Panel: This feature allows you to manually build and customize your workflow .

Methods and Algorithms:

- RapidMiner offers a diverse set of operators and algorithms, allowing for flexibility in model building.

About Dataset

- Name of the dataset survey residential.csv
- It has 768 records with 10 Attributes

Steps to cleaning the dataset:

- Select Attributes
- Normalize
- Detect Outliers
- Filter Examples

Importing dataset:

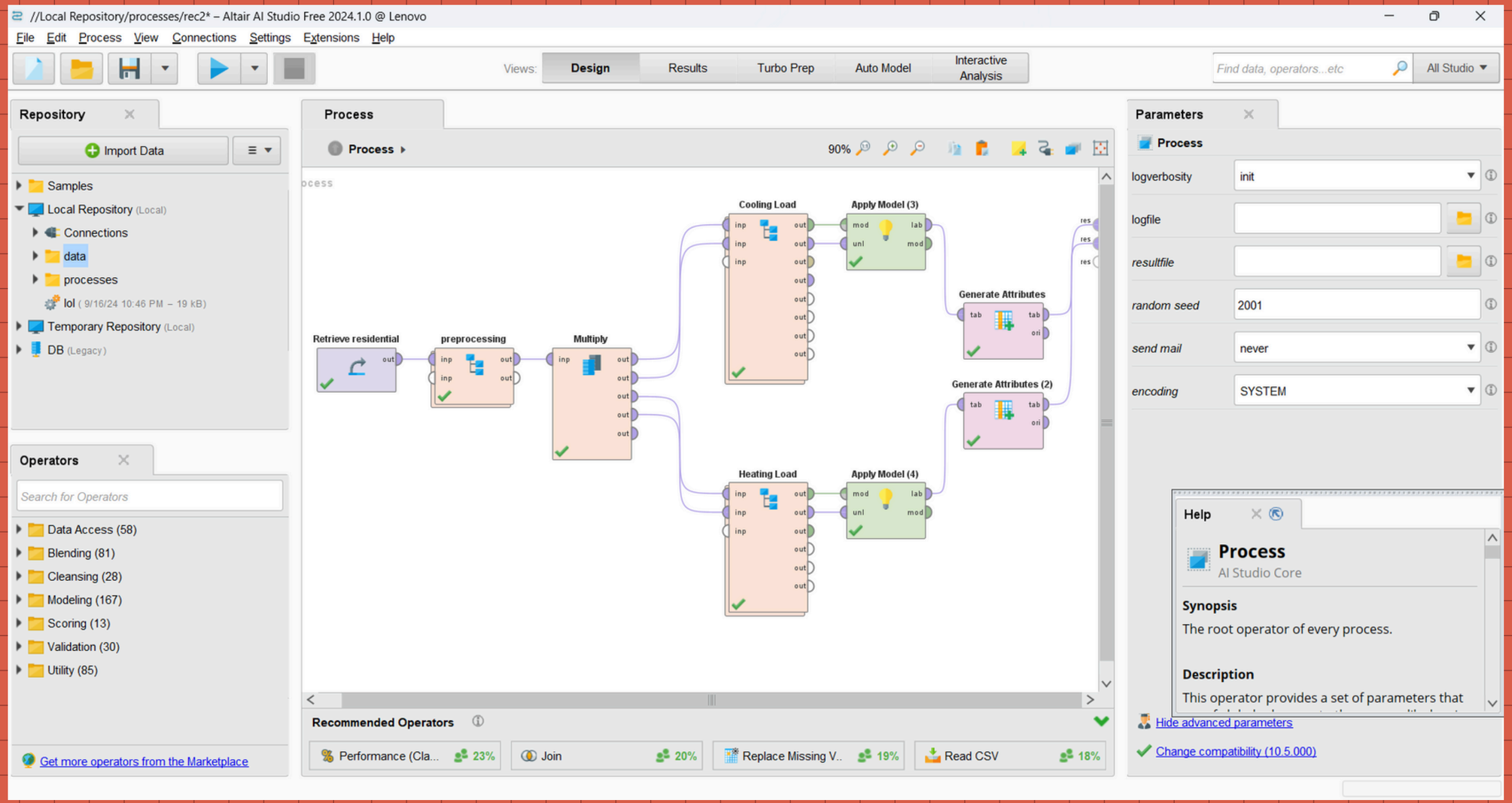
- Retrieve residential.csv

Attributes

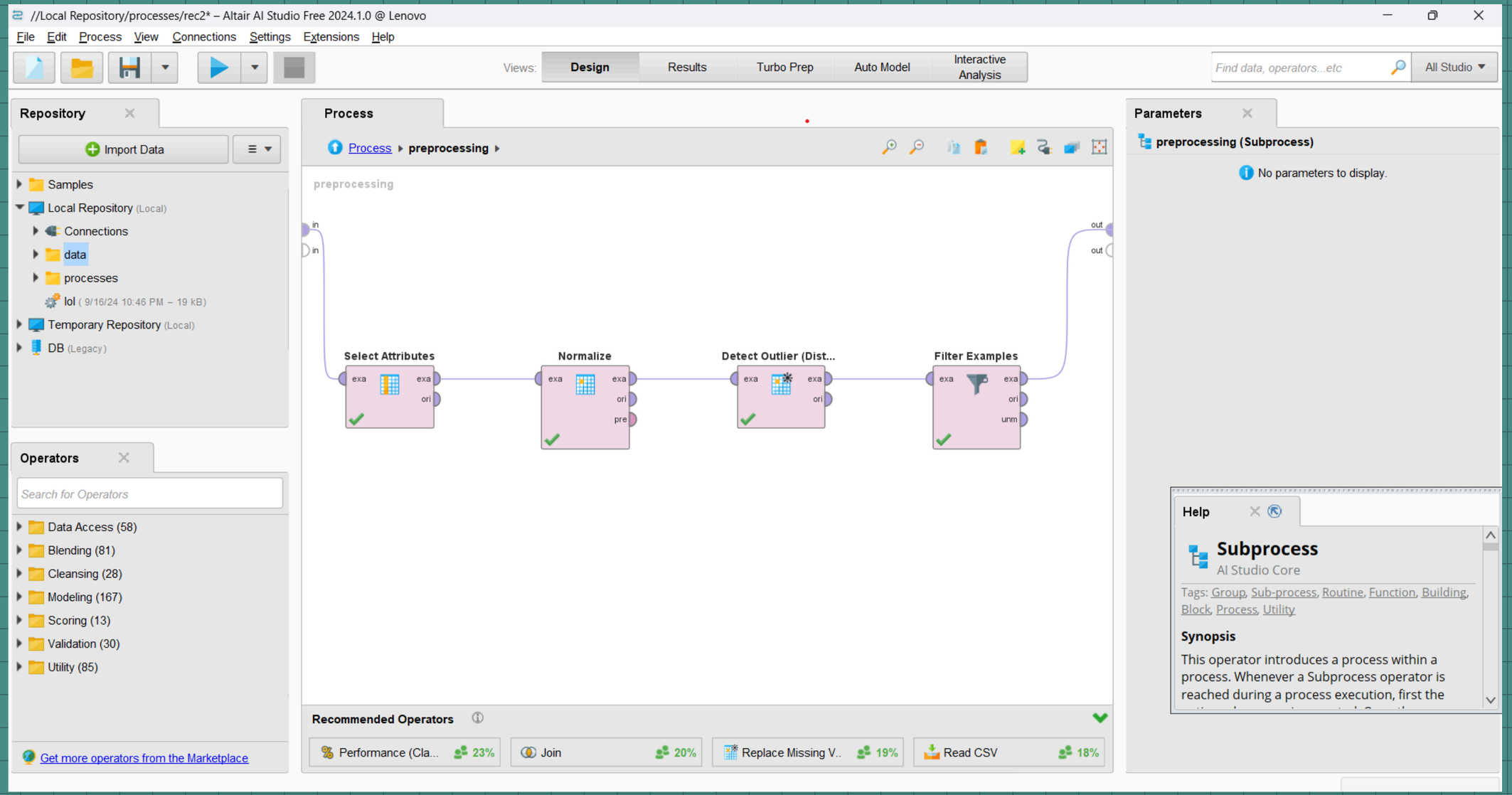
- X1 - Relative Compactness
- X2 - Surface Area
- X3 - Wall Area
- X4 - Roof Area
- X5 - Overall Height
- X6 - Orientation
- X7- Glazing Area. Three types of glazing areas, which are expressed as percentages of the floor area: 10%, 25%, and 40%.
- X8 - Glazing Area Distribution. (1) uniform: with 25% glazing on each side, (2) north: 55% on the north side and 15% on each of the other sides, (3) east: 55% on the east side and 15% on each of the other sides, (4) south: 55% on the south side and 15% on each of the other sides, and (5) west: 55% on the west side and 15% on each of the other sides.
- y1 - Heating Load
- y2 - Cooling Load

Predictive model using process panel

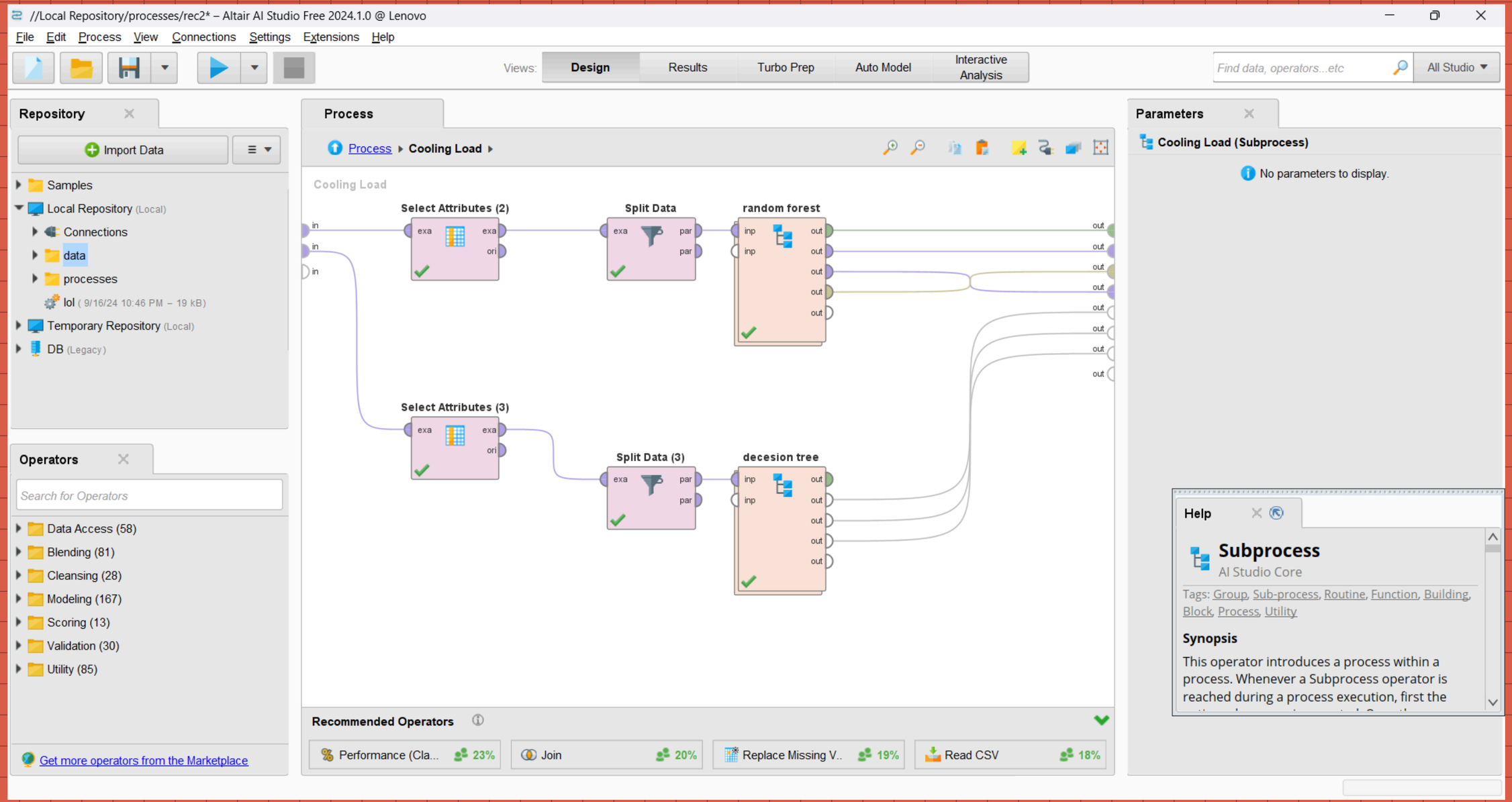
Overview of model



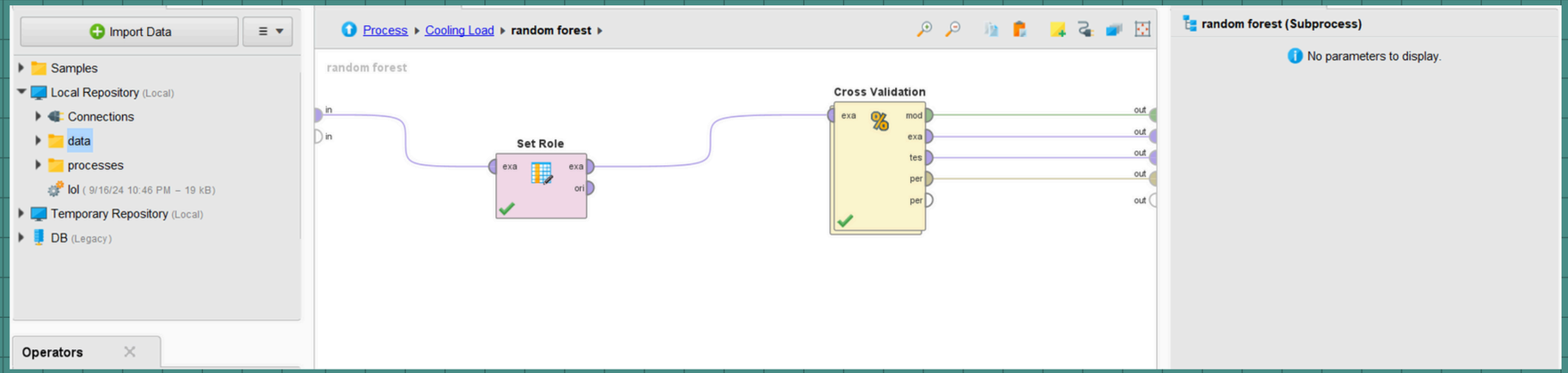
preprocessing module

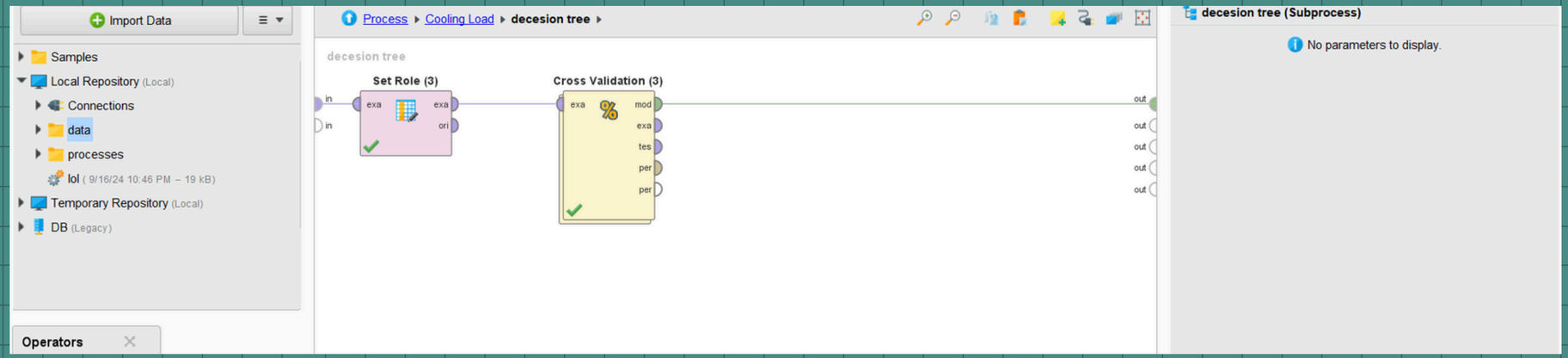


In cooling load

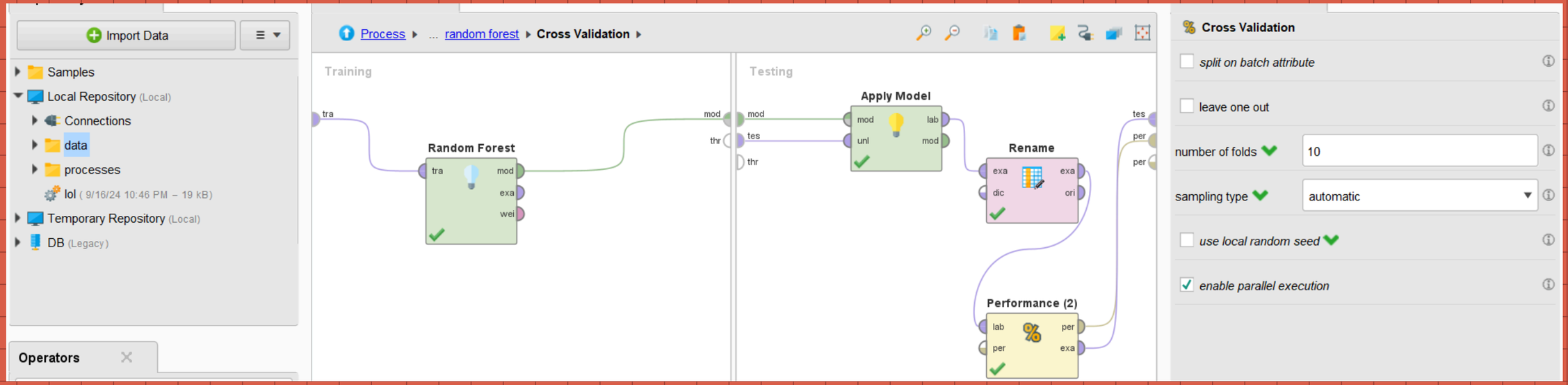


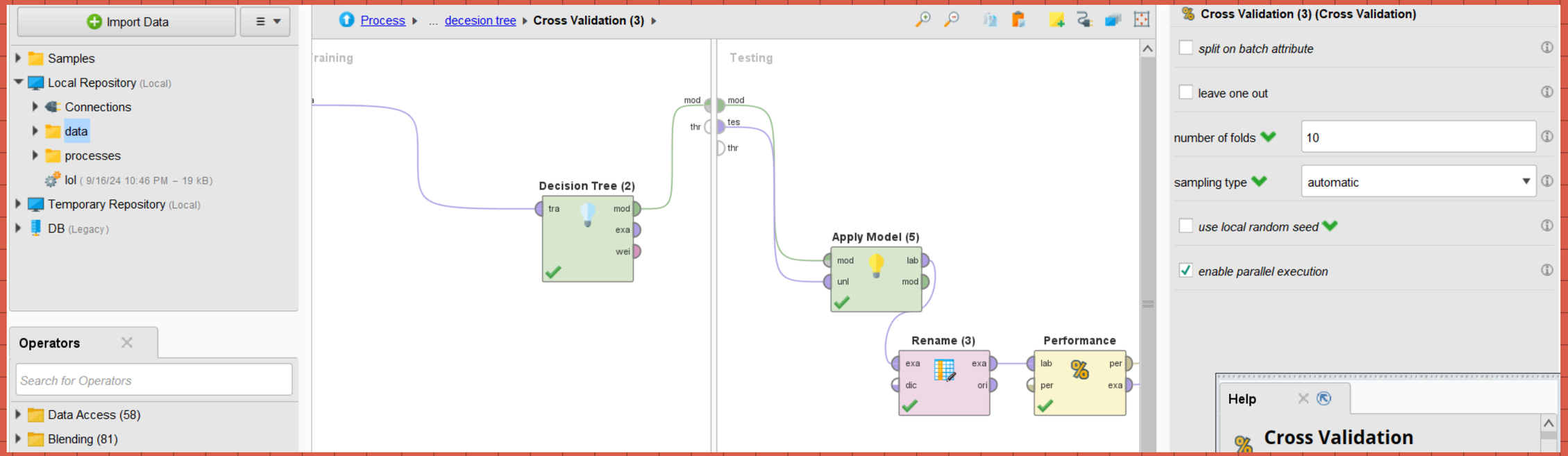
In Random forest and Decision Tree



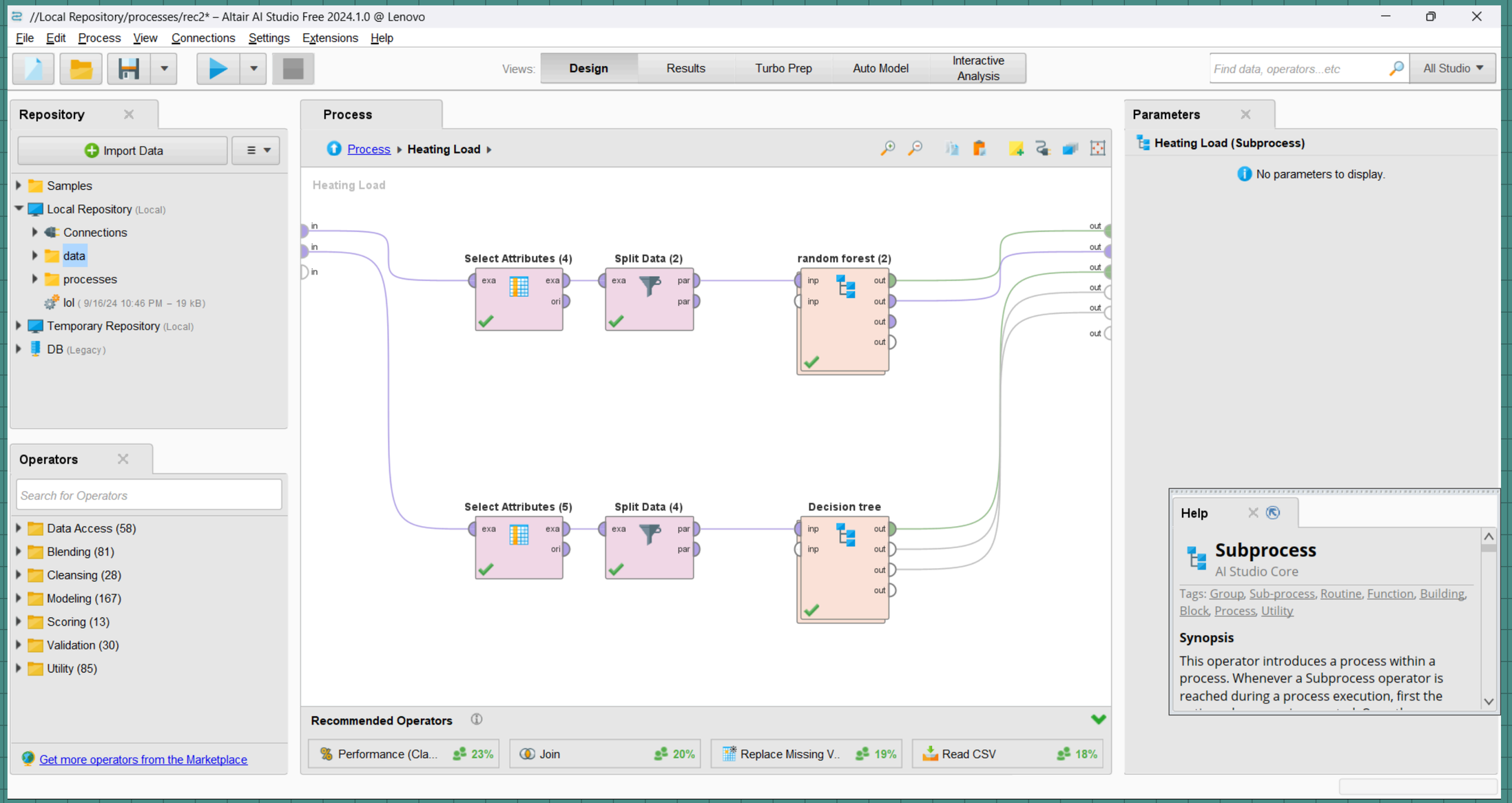


Inside the cross validation of both the decision tree and random forest

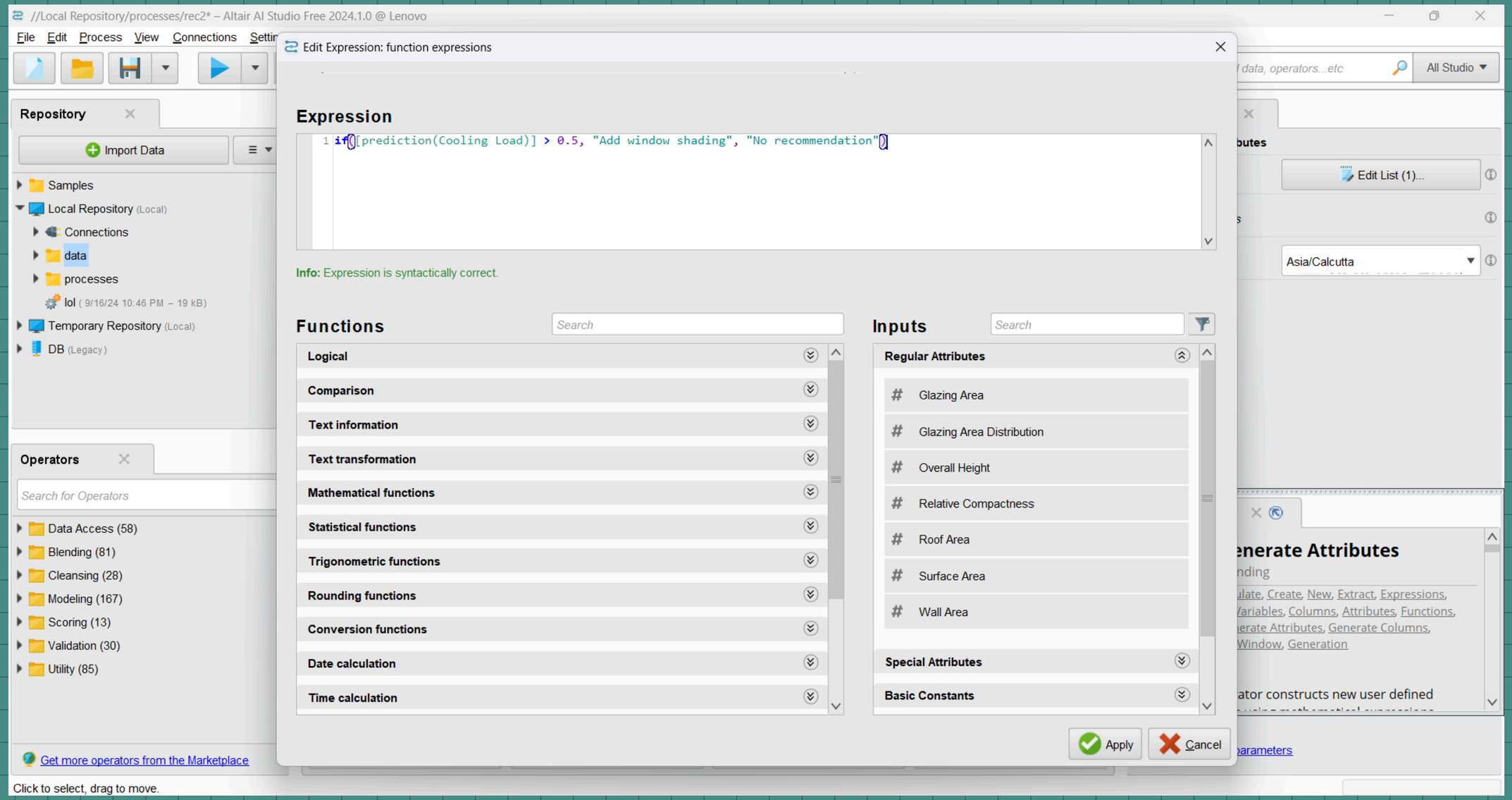




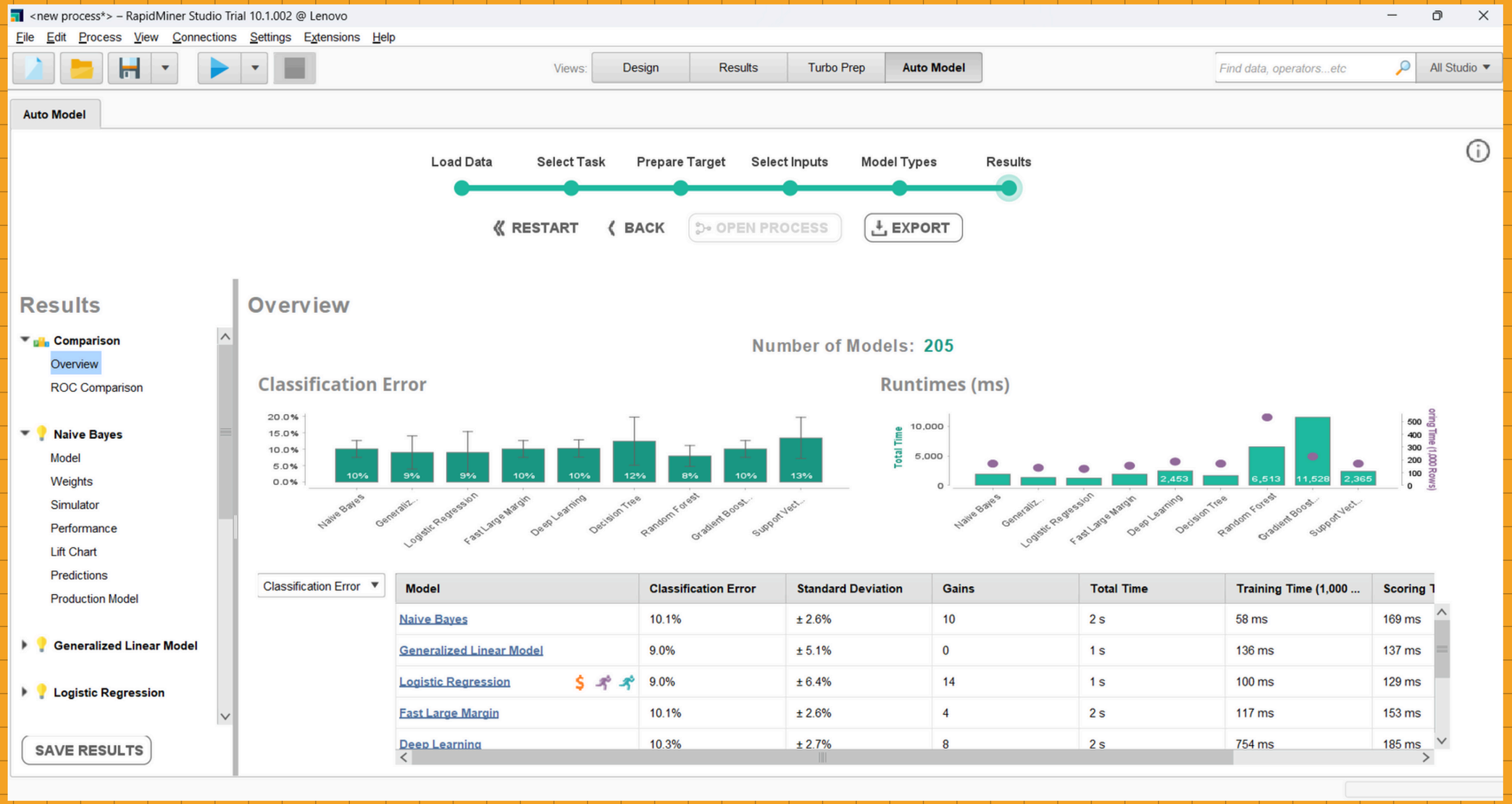
this same will be done in heating load just like cooling Load



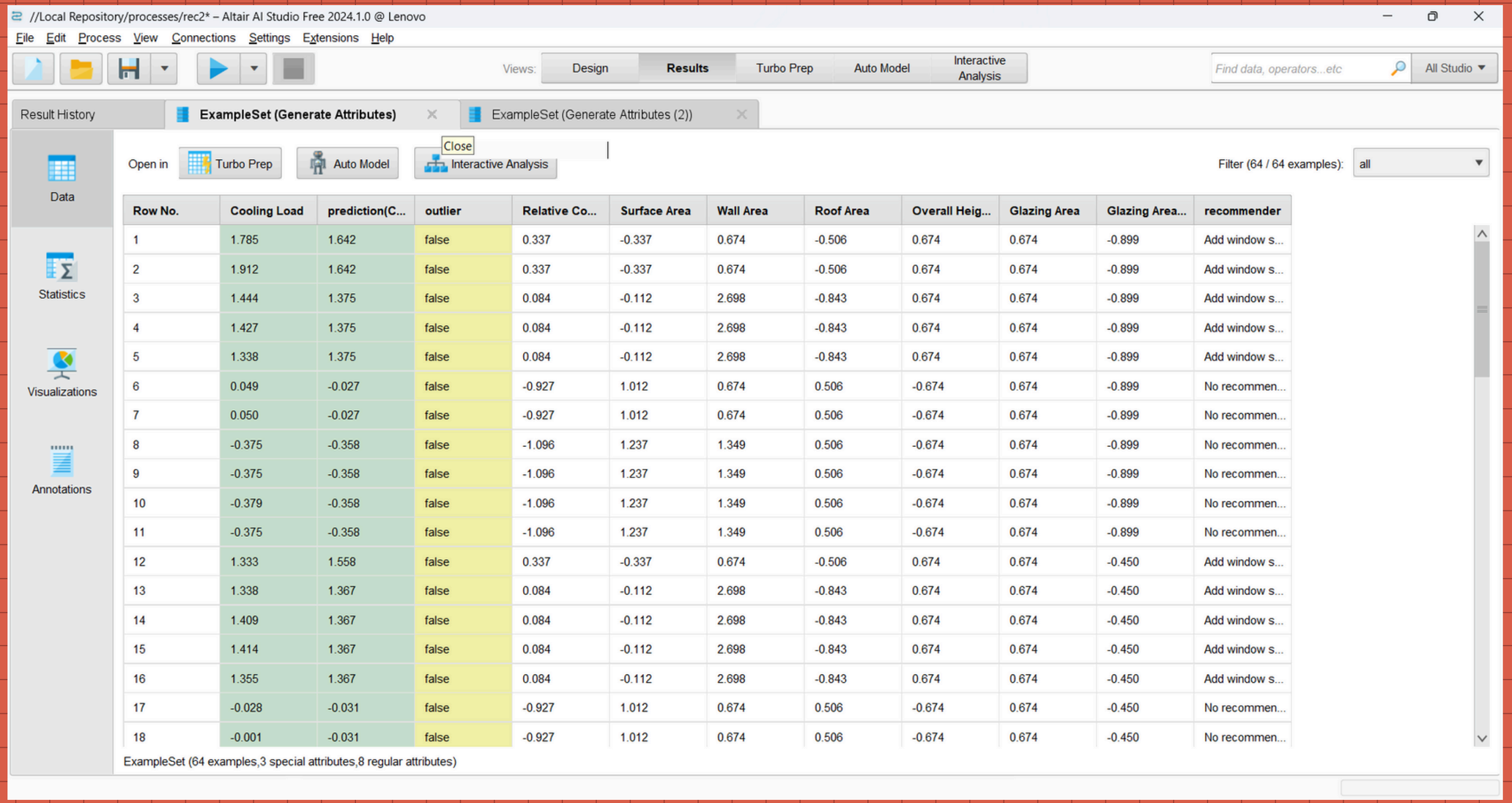
for Recommendation we are using generate attribute



Auto model approach can also be use it is a great tool



Result as prediction with Recommendation



Row No.	Cooling Load	prediction(C...	outlier	Relative Co...	Surface Area	Wall Area	Roof Area	Overall Heig...	Glazing Area	Glazing Area...	recommender
1	1.785	1.642	false	0.337	-0.337	0.674	-0.506	0.674	0.674	-0.899	Add window s...
2	1.912	1.642	false	0.337	-0.337	0.674	-0.506	0.674	0.674	-0.899	Add window s...
3	1.444	1.375	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.899	Add window s...
4	1.427	1.375	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.899	Add window s...
5	1.338	1.375	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.899	Add window s...
6	0.049	-0.027	false	-0.927	1.012	0.674	0.506	-0.674	0.674	-0.899	No recommen...
7	0.050	-0.027	false	-0.927	1.012	0.674	0.506	-0.674	0.674	-0.899	No recommen...
8	-0.375	-0.358	false	-1.096	1.237	1.349	0.506	-0.674	0.674	-0.899	No recommen...
9	-0.375	-0.358	false	-1.096	1.237	1.349	0.506	-0.674	0.674	-0.899	No recommen...
10	-0.379	-0.358	false	-1.096	1.237	1.349	0.506	-0.674	0.674	-0.899	No recommen...
11	-0.375	-0.358	false	-1.096	1.237	1.349	0.506	-0.674	0.674	-0.899	No recommen...
12	1.333	1.558	false	0.337	-0.337	0.674	-0.506	0.674	0.674	-0.450	Add window s...
13	1.338	1.367	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.450	Add window s...
14	1.409	1.367	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.450	Add window s...
15	1.414	1.367	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.450	Add window s...
16	1.355	1.367	false	0.084	-0.112	2.698	-0.843	0.674	0.674	-0.450	Add window s...
17	-0.028	-0.031	false	-0.927	1.012	0.674	0.506	-0.674	0.674	-0.450	No recommen...
18	-0.001	-0.031	false	-0.927	1.012	0.674	0.506	-0.674	0.674	-0.450	No recommen...

ExampleSet (64 examples,3 special attributes,8 regular attributes)

Thank you