SDU ENERGY INFORMATICS

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Model Report: DecisionTree

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Introduction

This is an automated report for the Test on Tetouan City consumption data; the DecisionTree model.

This report will first introduce the model setup, including the hyperparameters and search algorithms used. Hereafter the base dataset will be described, and the differently created training datasets will be listed. After that, the results for the different forecast types will be presented, and the best results will be shown in plots.

Experiment description:

First experiment on the dataset with Tetouan City dataset.

Model setup

The model has been used for the following forecast purposes:

- one_step
- multistep
- recursive

The model has been optimized using the following hyperparameters:

- max_depth: [2, 4, 6, 8, 10, 15, 20]
- criterion: ['squared_error']
- random_state: [42]
- min_samples_split: [5, 10, 50, 150, 200, 250]
- min_samples_leaf: [5, 10, 25, 50, 100]
- scaler: [None, StandardScaler(), MinMaxScaler(), RobustScaler(), PowerTransformer()]

And with the following search algorithms:

- grid
- random

The used performance measure is the r2 measure.

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Dataset setup

The baseline dataset used for these forecasts is the 'Power consumption of Tetouan City between 2017-01-01 and 2017-12-31 in 10 minutes resolution.' dataset: *'Power consumption of Tetouan City between 2017-01-01 and 2017-12-31 in 10 minutes resolution. Has the weather data for temperature, humidity, wind speed and diffuse flows, as well as the consumption data for 3 different zones in the city. For simplicity, we will only use one of the zones.'.*

The test size used for the forecasts is 0.2.

- Dataset 1
  - name: univariate_temporal
  - dataset_type: univariate
  - prediction_type: one_step
  - components: ['one_step_target', 'temporal_features']

- Dataset 2
  - name: univariate_lagged
  - dataset_type: univariate
  - prediction_type: one_step
  - components: ['one_step_target', 'lagged_target']

- Dataset 3
  - name: univariate_temporal_and_lagged
  - dataset_type: univariate
  - prediction_type: one_step
  - components: ['one_step_target', 'temporal_features', 'lagged_target']

- Dataset 4
  - name: univariate_multistep_temporal
  - dataset_type: univariate
  - prediction_type: multistep
  - components: ['multistep_target', 'temporal_features']

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Dataset 5

- name: univariate_multistep_lagged
- dataset_type: univariate
- prediction_type: multistep
- components: ['multistep_target', 'lagged_target']

○ Dataset 6

- name: univariate_multistep_temporal_and_lagged
- dataset_type: univariate
- prediction_type: multistep
- components: ['multistep_target', 'temporal_features', 'lagged_target']

○ Dataset 7

- name: multivariate_temporal
- dataset_type: multivariate
- prediction_type: one_step
- components: ['one_step_target', 'feature_columns', 'temporal_features']

○ Dataset 8

- name: multivariate_lagged
- dataset_type: multivariate
- prediction_type: one_step
- components: ['one_step_target', 'feature_columns', 'lagged_target']

○ Dataset 9

- name: multivariate_temporal_and_lagged
- dataset_type: multivariate
- prediction_type: one_step
- components: ['one_step_target', 'feature_columns', 'temporal_features', 'lagged_target']

○

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Dataset 10

- name: multivariate_multistep_temporal
- dataset_type: multivariate
- prediction_type: multistep
- components: ['multistep_target', 'feature_columns', 'temporal_features']

○ Dataset 11

- name: multivariate_multistep_lagged
- dataset_type: multivariate
- prediction_type: multistep
- components: ['multistep_target', 'feature_columns', 'lagged_target']

○ Dataset 12

- name: multivariate_multistep_temporal_and_lagged
- dataset_type: multivariate
- prediction_type: multistep
- components: ['multistep_target', 'feature_columns', 'temporal_features', 'lagged_target']

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Results: DecisionTree

The presentation of the results follows this system: For each prediction type, the best and worst results for each combination of search method and dataset type are presented in heat plots along with the corresponding model setup.

- Then, if the prediction type is one-step forecasts, the best prediction over time is visualized in a line plot.

- If the prediction type is a multi-step forecast, either direct or recursive, the model with the average best r2 score is chosen, and the three best and worst predictions are visualized in a line plot. Furthermore, three steps of the forecasts are plotted.

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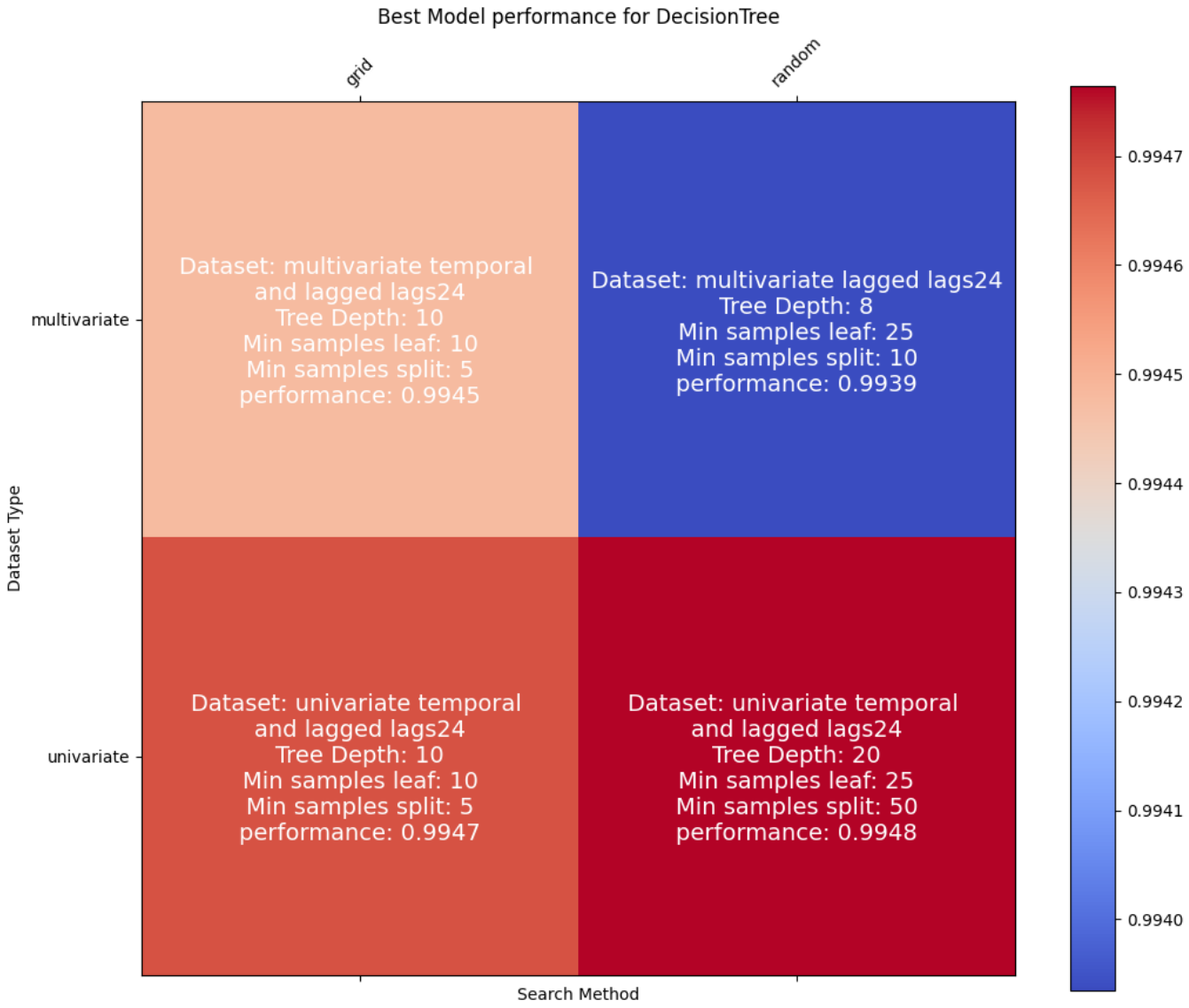
Results for the one_step forecast.

The best results (one_step) for the different setup combinations are as follows:



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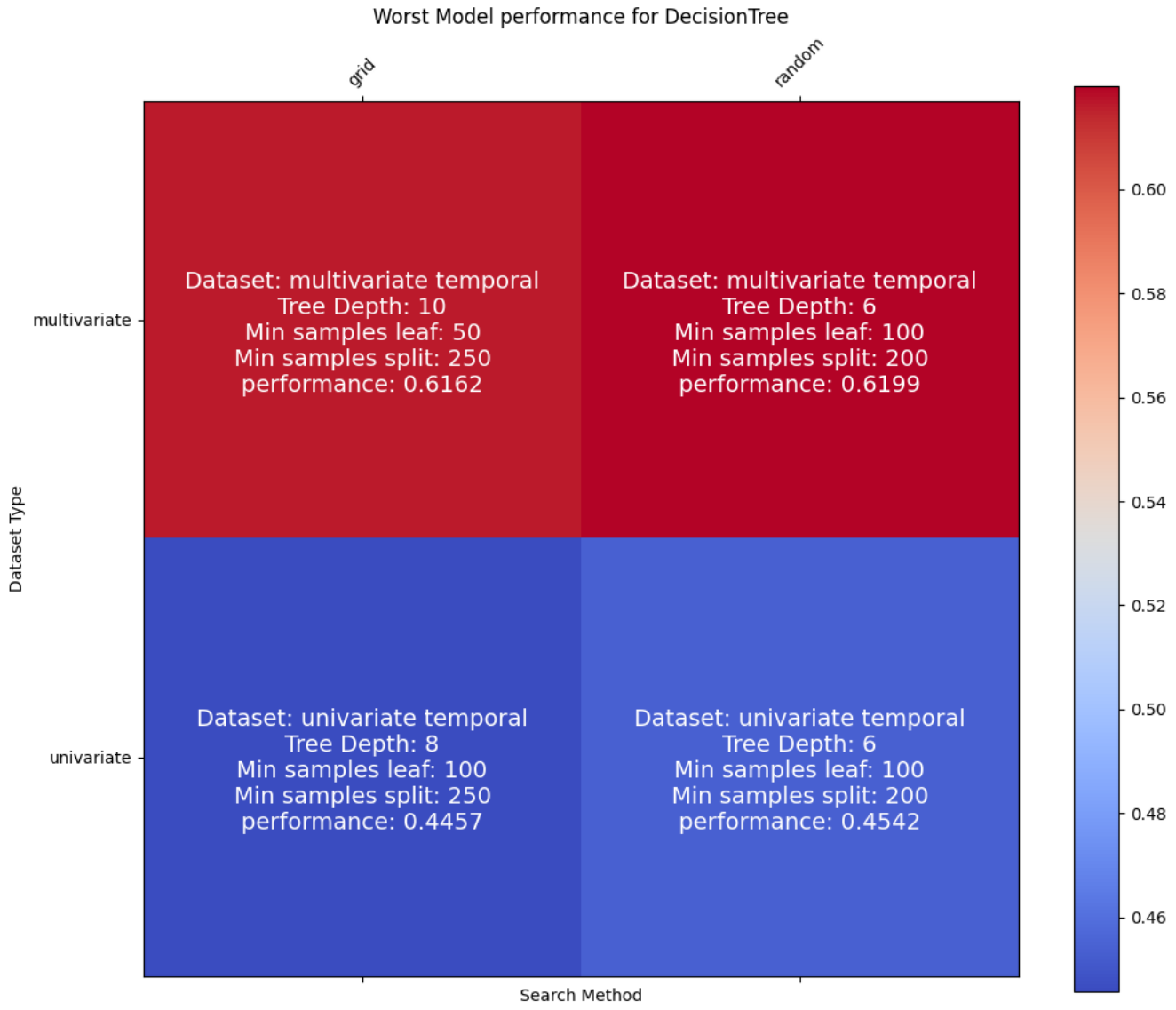
The worst results (one_step) for the different setup combinations are as follows:



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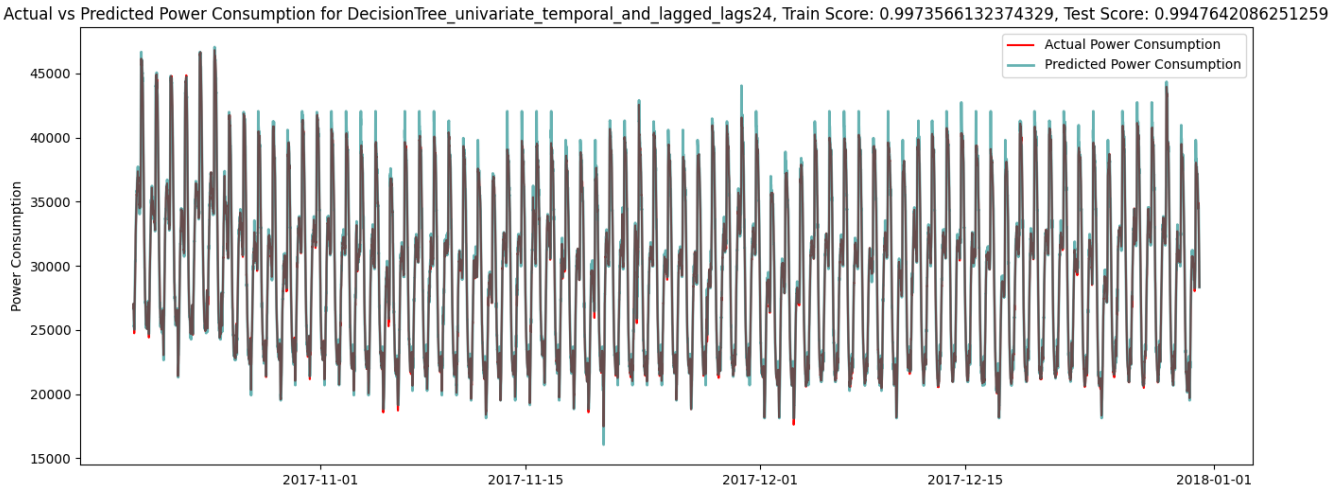
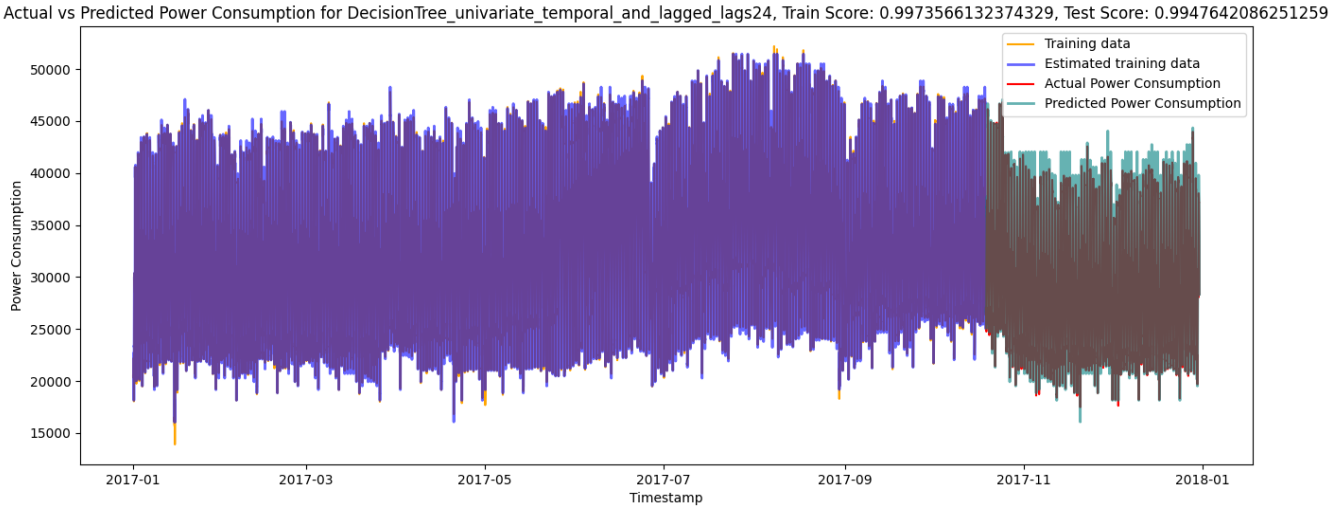
Best one_step forecast over time





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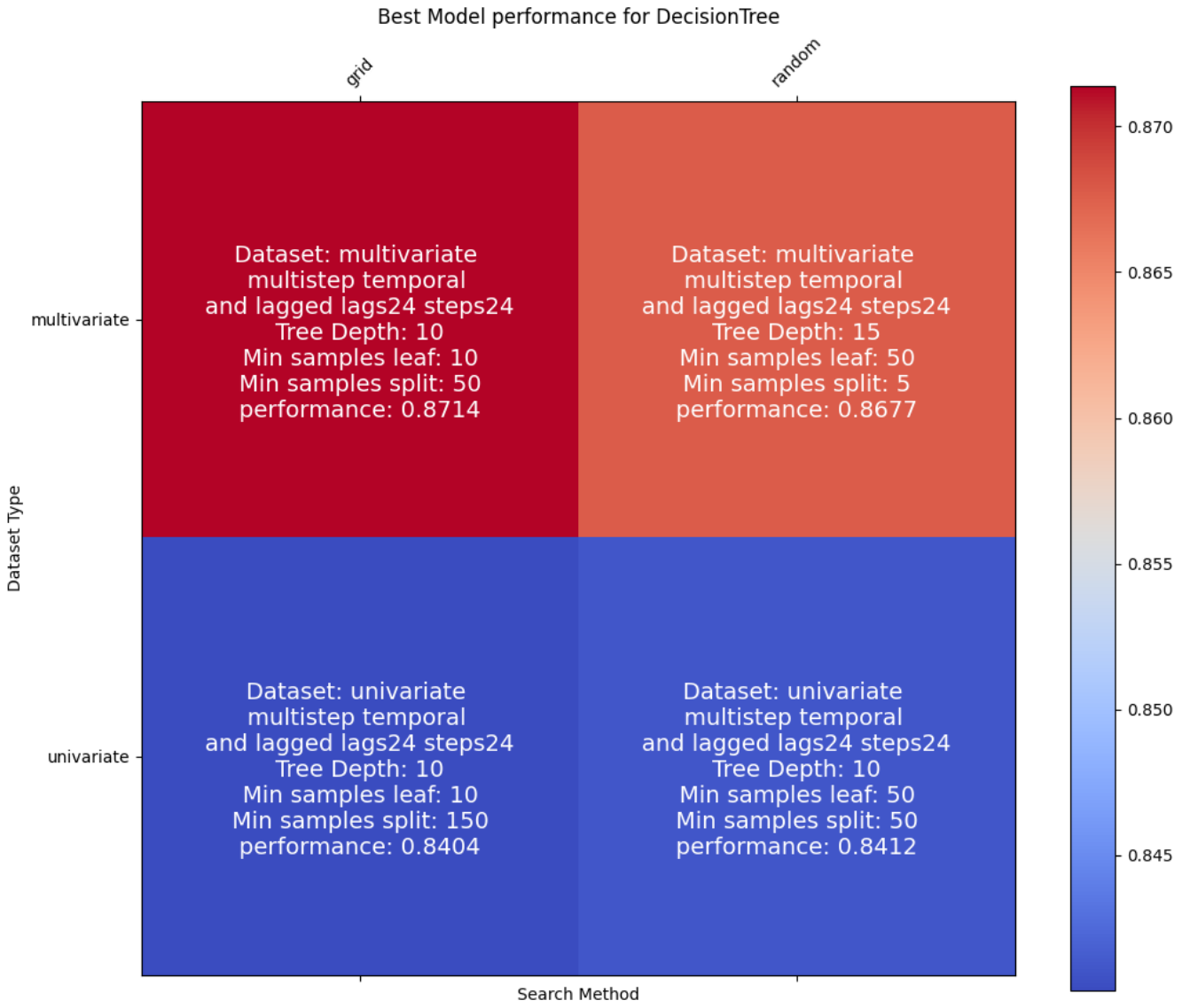
Results for the multistep forecast.

The best results (multistep) for the different setup combinations are as follows:



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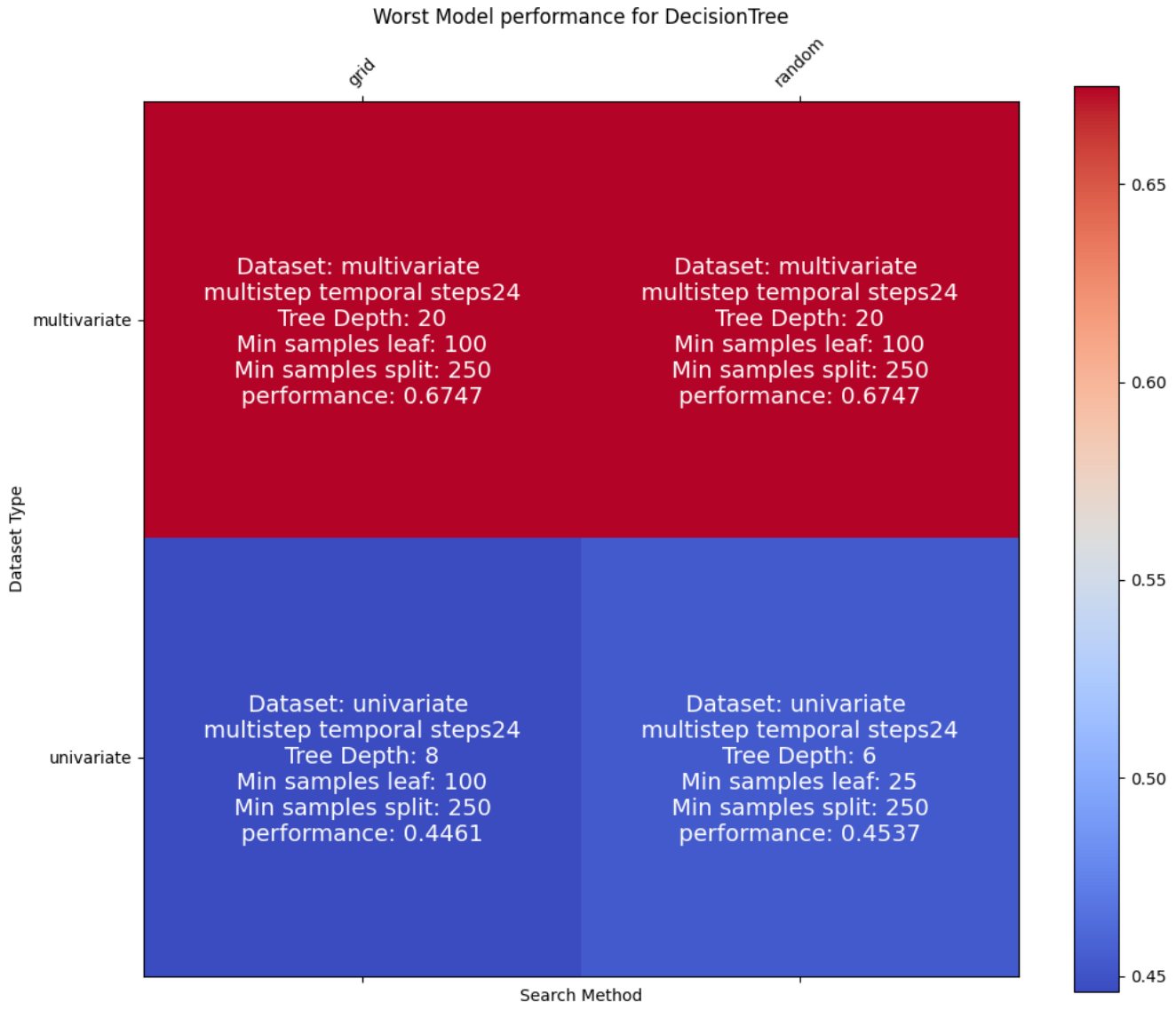
The worst results (multistep) for the different setup combinations are as follows:



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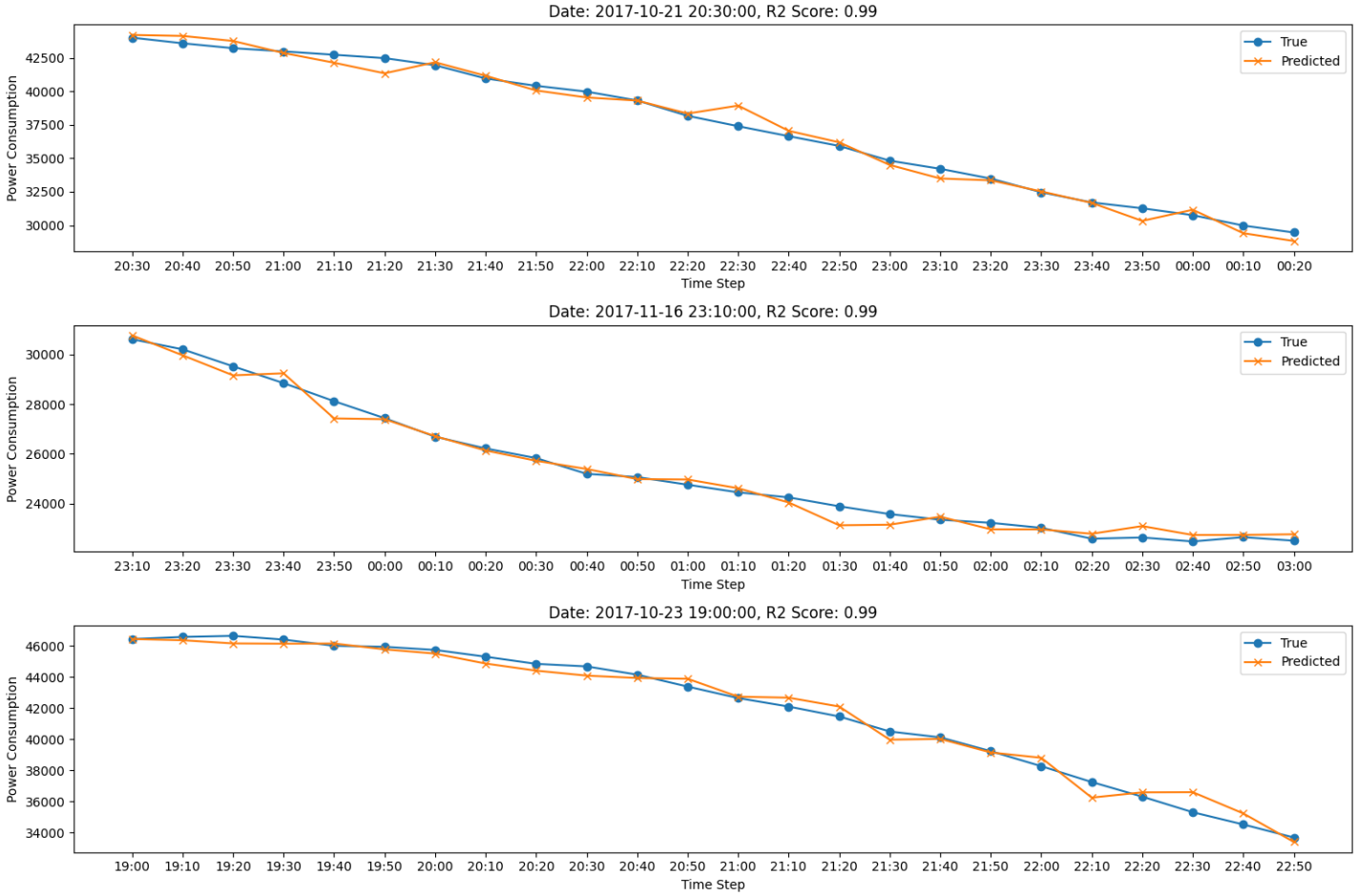
Best predicted days for DecisionTree.



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Worst predicted days for DecisionTree.

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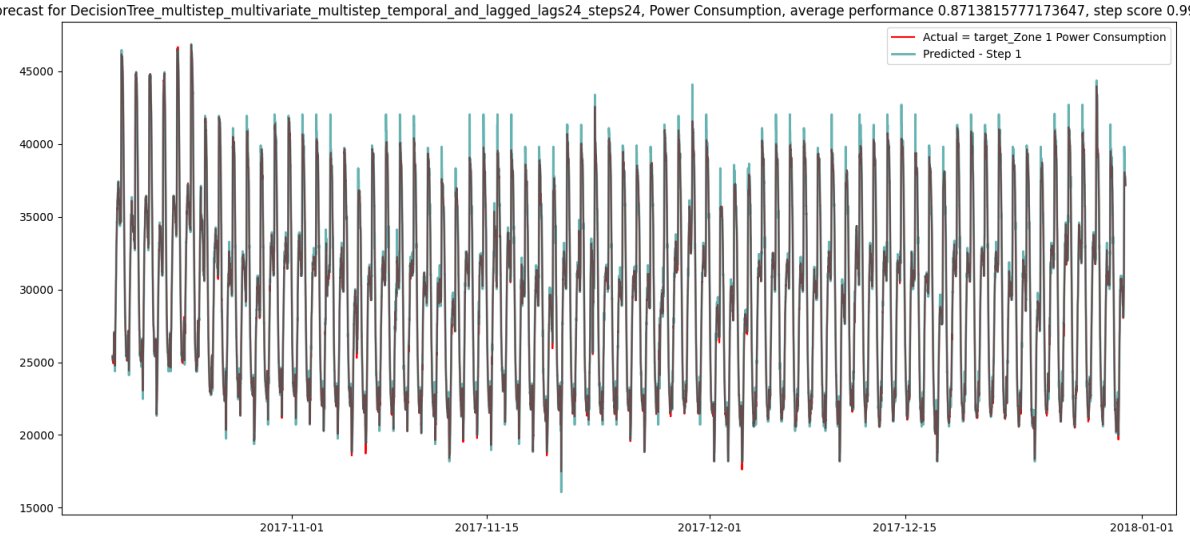
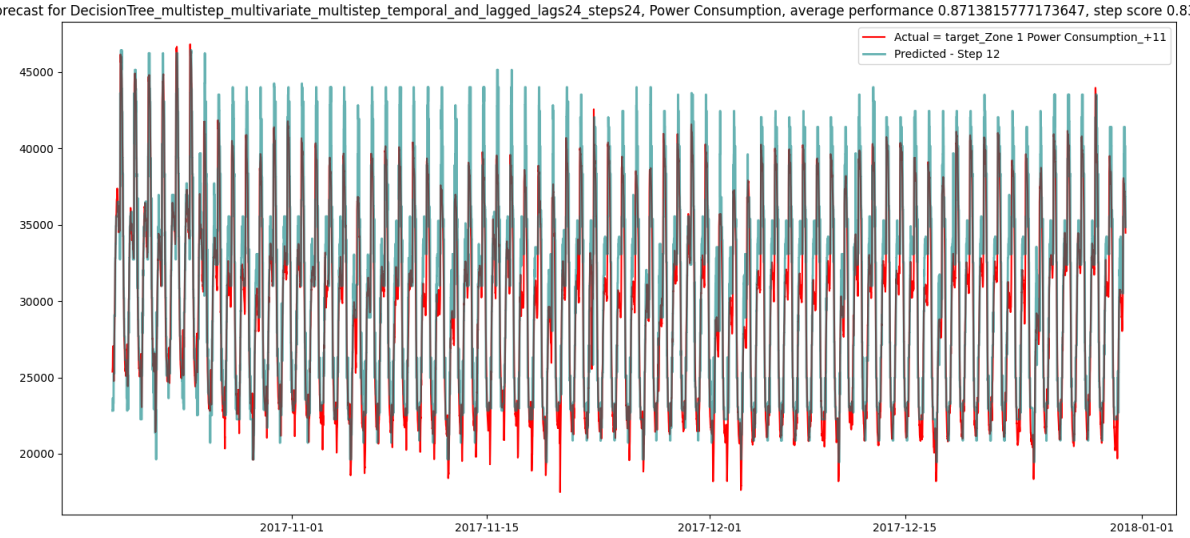
Steps plots for DecisionTree forecasts over time

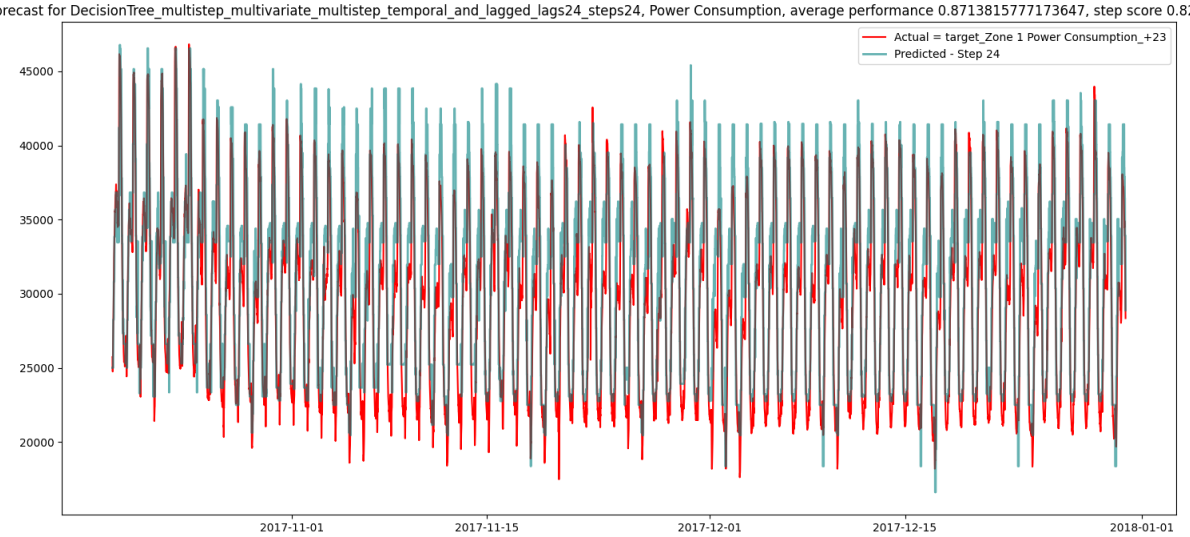
Multistep forecast for DecisionTree_multistep_multivariate_multistep_temporal_and_lagged_lags24_steps24, Power Consumption, average performance 0.8713815777173647, step score 0.9946610073622831



Multistep forecast for DecisionTree_multistep_multivariate_multistep_temporal_and_lagged_lags24_steps24, Power Consumption, average performance 0.8713815777173647, step score 0.8307180811628887



Multistep forecast for DecisionTree_multistep_multivariate_multistep_temporal_and_lagged_lags24_steps24, Power Consumption, average performance 0.8713815777173647, step score 0.8203734616536685



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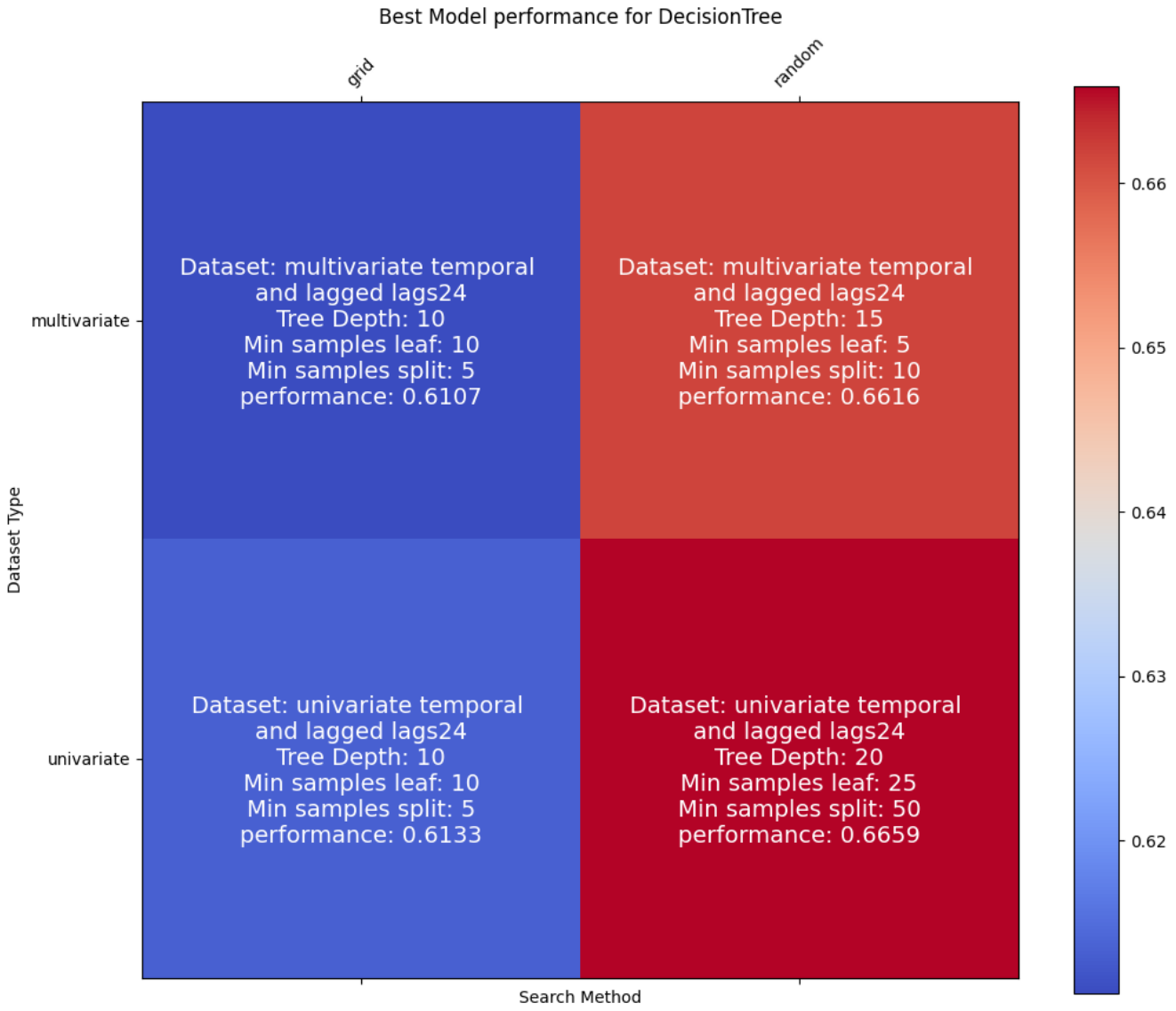
Results for the recursive forecast.

The best results (recursive) for the different setup combinations are as follows:



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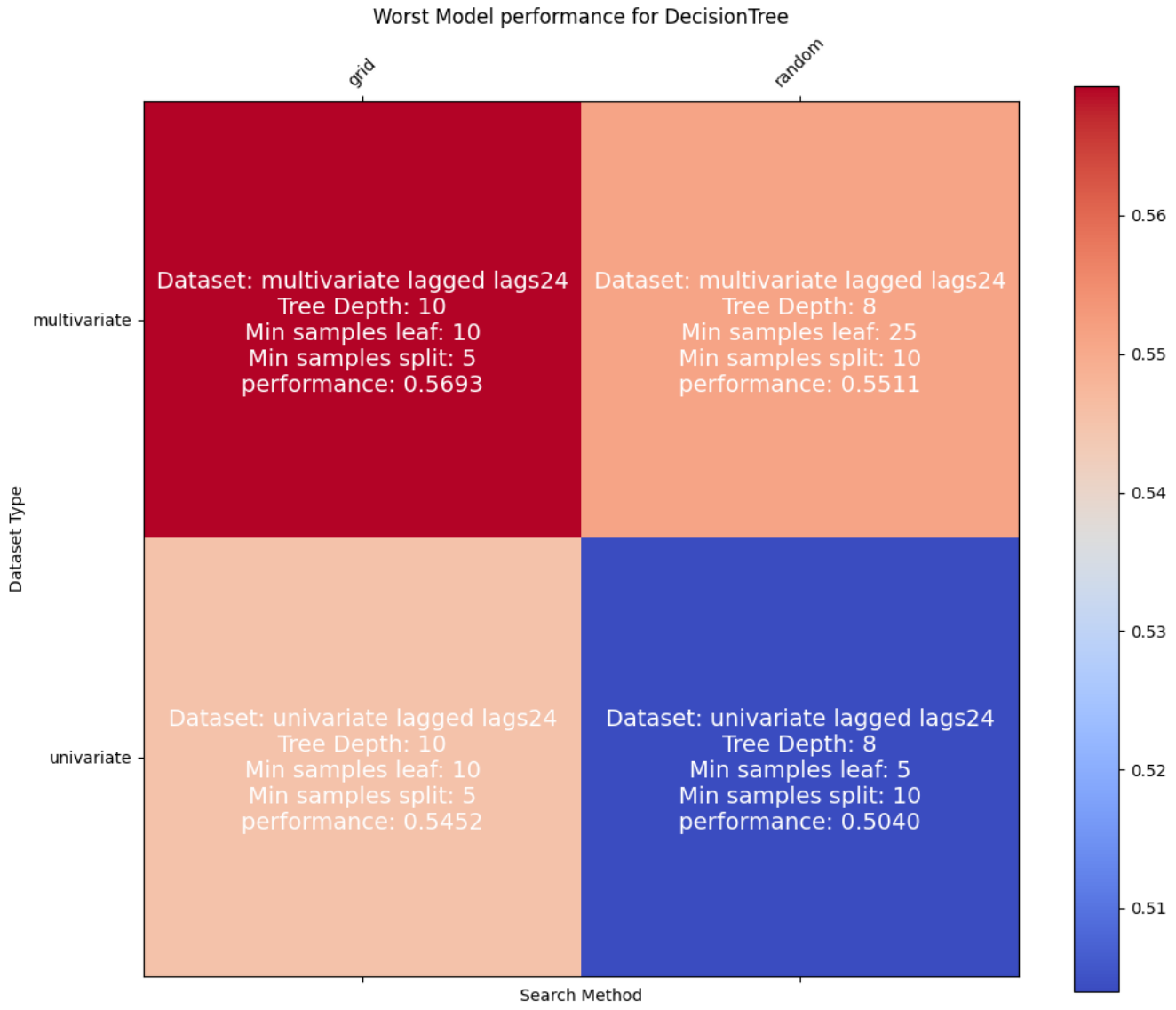
The worst results (recursive) for the different setup combinations are as follows:



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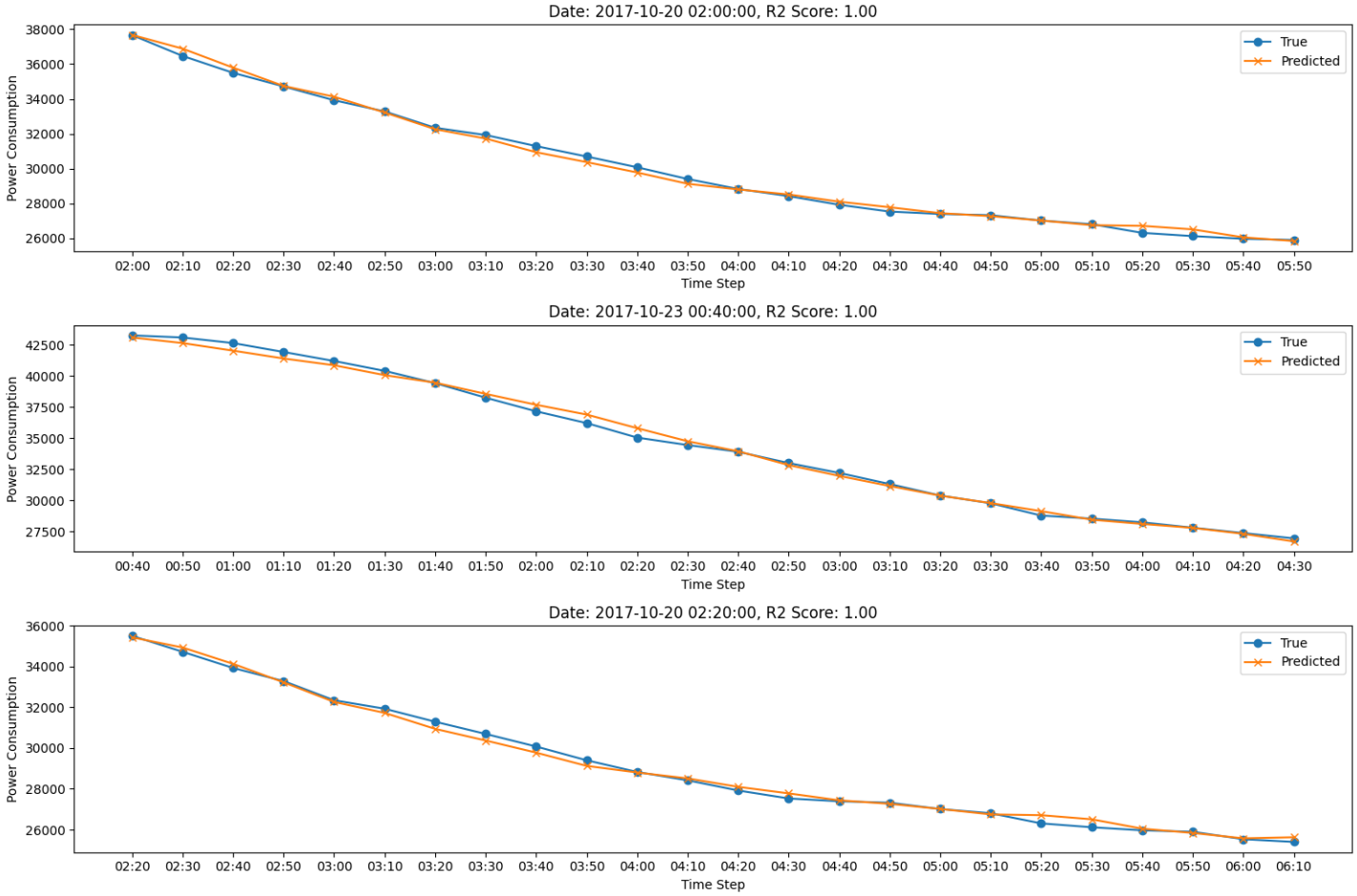
Best predicted days for DecisionTree.



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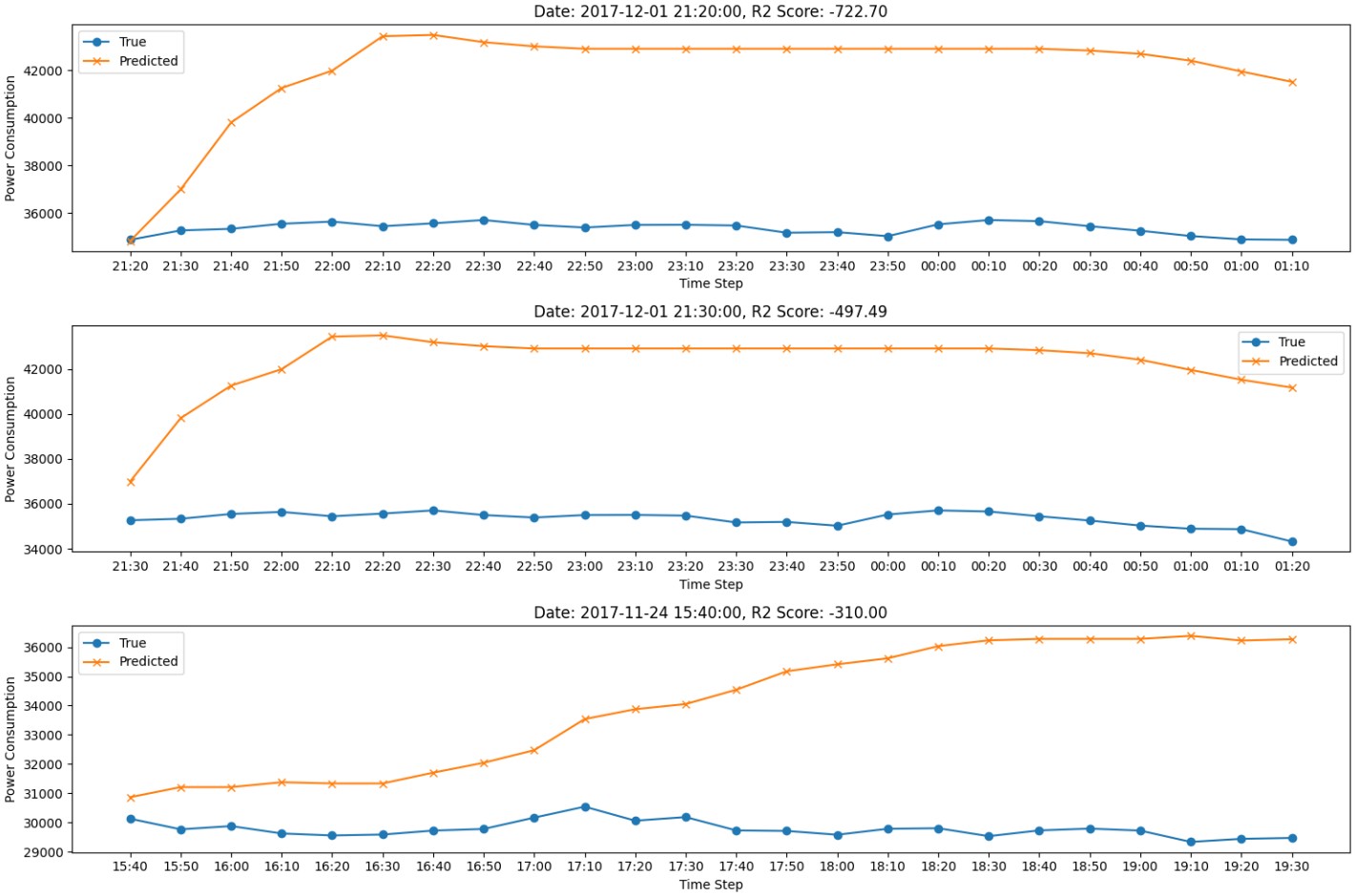
Worst predicted days for DecisionTree.



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Steps plots for DecisionTree forecasts over time