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Collected Experiment Report: SimpleNN - DeepNN .

16/02/2025

Introduction

This is an automated report for the Experiment with neural networks on traffic volume dataset; the following models have been analyzed:

○ SimpleNN

○ DeepNN

Experiment description:

Experiment with neural networks on traffic volume dataset

Model setup

The models have been used for the following forecast purposes:

○ one_step

○ multistep

○ recursive

The models have been optimized using the following hyperparameters:

- optimizer: ['adam', 'sgd']

- epochs: [100, 200]

- batch_size: [32, 64]

- scaler: [None, StandardScaler(), MinMaxScaler(), RobustScaler(), PowerTransformer()]

And with the following search algorithms:

○ grid

○ random

The used performance measure is the neg_mean_absolute_error measure.

Dataset setup

The baseline dataset used for these forecasts is
the 'Metro Interstate Traffic Volume with hourly features and holiday markings.' dataset: *'Metro Interstate Traffic Volume with hourly features and holiday markings.'.*

The test size used for the forecasts is 0.2.

○ Dataset 1

- name: univariate_lagged

- dataset_type: univariate

- prediction_type: one_step

- components: ['one_step_target', 'lagged_target']

○ Dataset 2

- name: univariate_temporal

- dataset_type: univariate

- prediction_type: one_step

- components: ['one_step_target', 'temporal_features']

○ Dataset 3

- name: multivariate_lagged

- dataset_type: multivariate

- prediction_type: one_step

- components: ['one_step_target', 'lagged_target', 'feature_columns']

○ Dataset 4

- name: multivariate_lagged_temporal

- dataset_type: multivariate

- prediction_type: one_step

- components: ['one_step_target', 'temporal_features', 'feature_columns', 'lagged_target']

○ Dataset 5

- name: univariate_lagged_multistep

- dataset_type: univariate

- prediction_type: multistep

- components: ['multistep_target', 'lagged_target']

○ Dataset 6

- name: multivariate_lagged_temporal_multistep

- dataset_type: multivariate

- prediction_type: multistep

- components: ['multistep_target', 'temporal_features', 'feature_columns', 'lagged_target']

Results

For the models; SimpleNN, DeepNN, the following models and datasets yielded the best results.

The best model for one_step forecasting.

The best model for one_step forecasting is the DeepNN model.
The model has been trained on the multivariate_lagged_temporal_lags10 dataset.

The best score for the one_step forecasting is 0.9670901298522949.
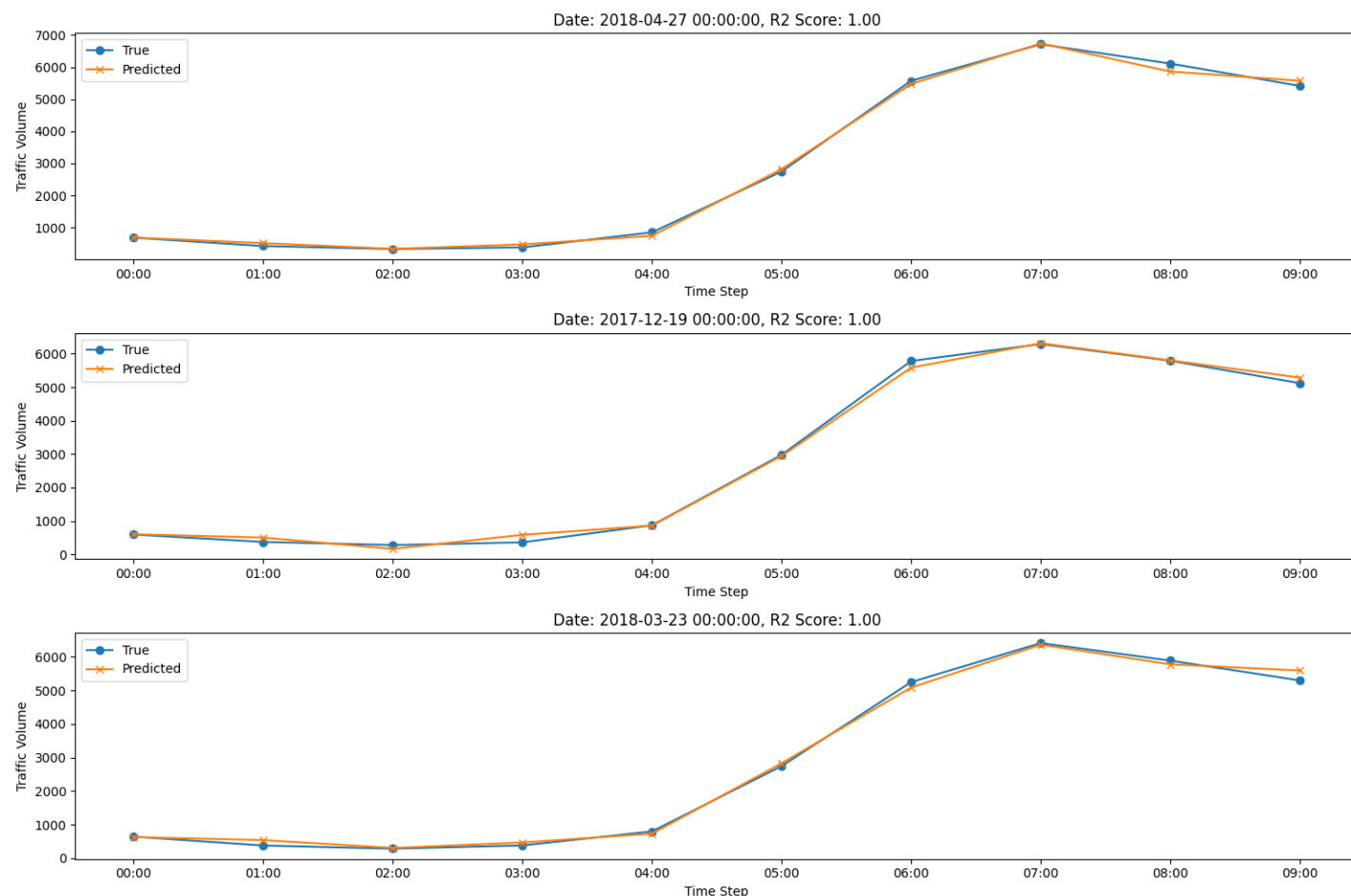
Best DeepNN forecast over time
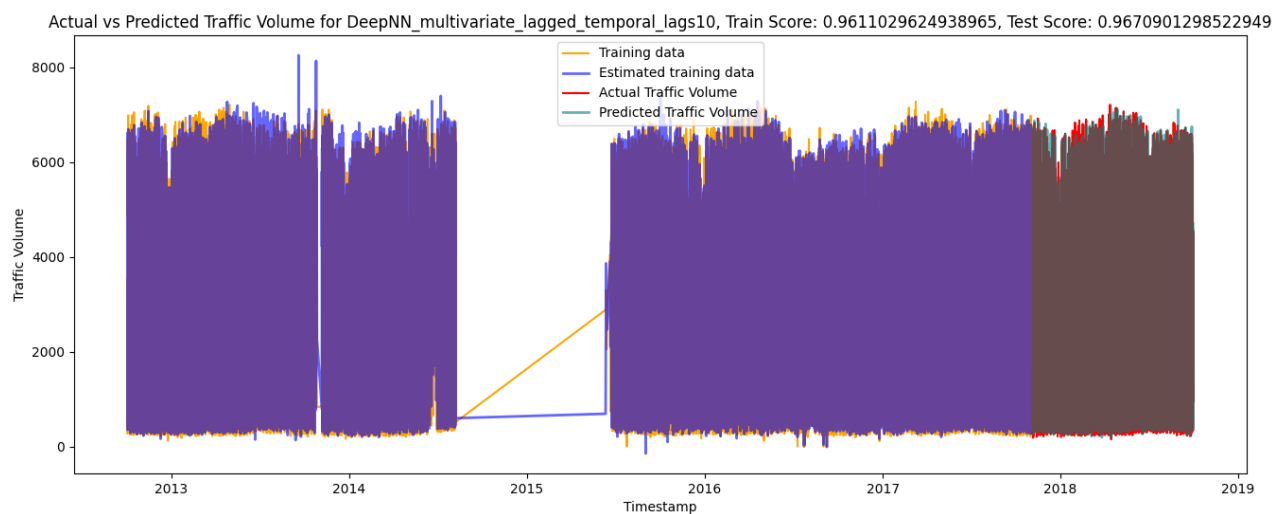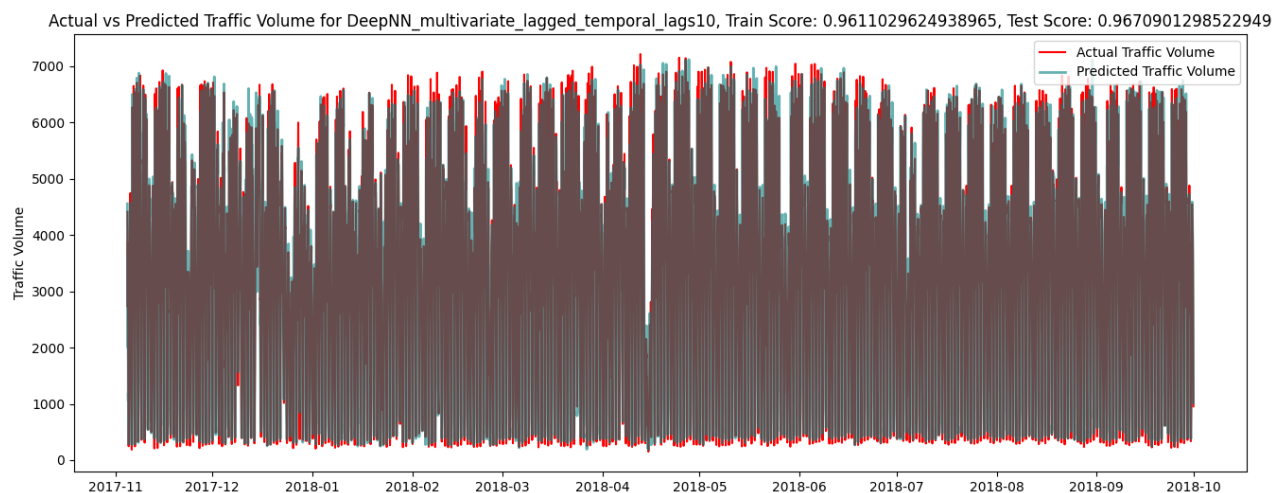
The best model for multistep forecasting.

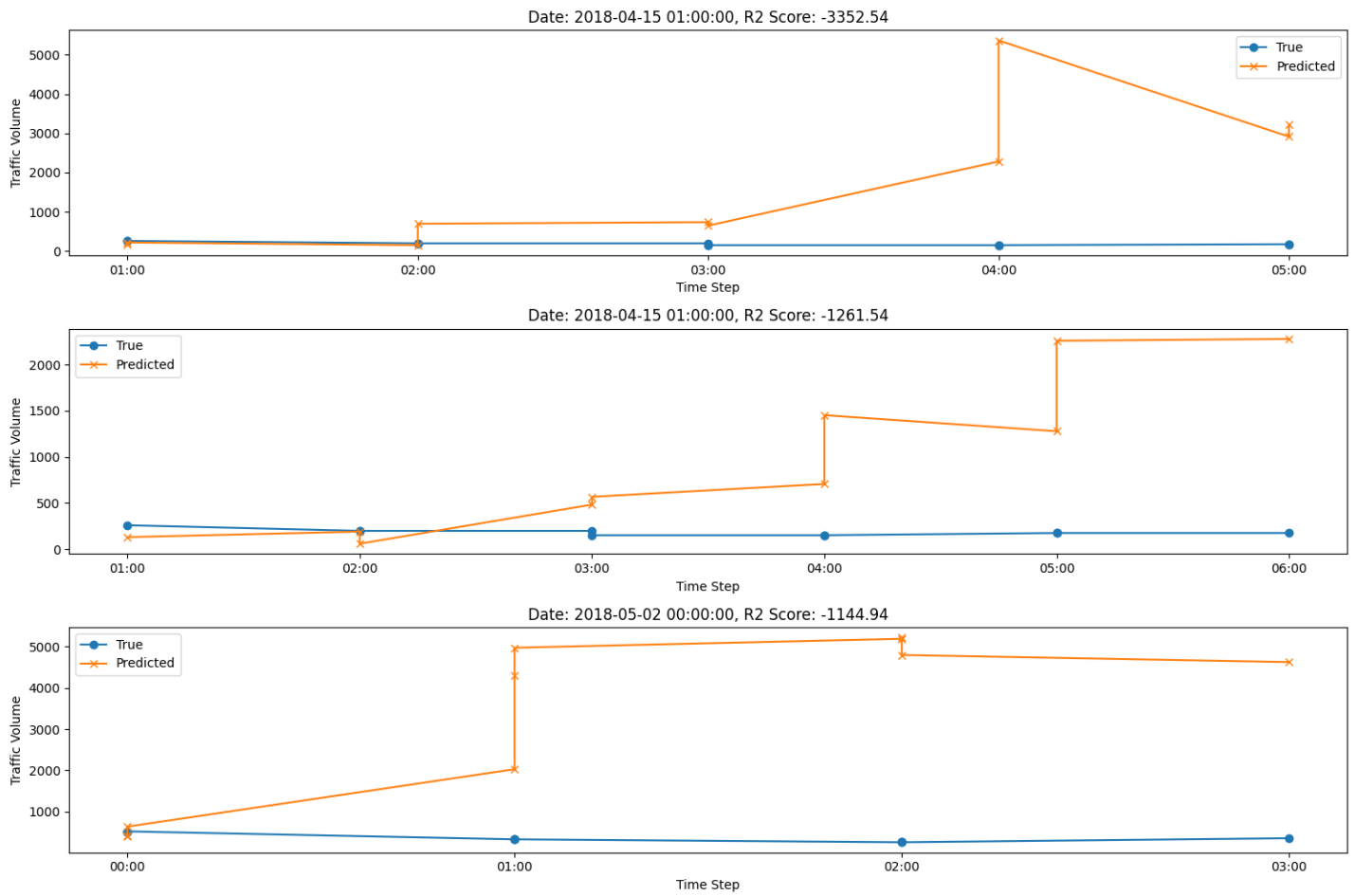The best model for multistep forecasting is the DeepNN model.
The model has been trained on the multivariate_lagged_temporal_multistep_lags10_steps10 dataset.

The best score for the multistep forecasting is 0.8332775235176086.

Best predicted days for DeepNN.

Worst predicted days for DeepNN.

Date: 2018-04-15 01:00:00, R2 Score: -3352.54

Date: 2018-04-15 01:00:00, R2 Score: -1261.54

Date: 2018-05-02 00:00:00, R2 Score: -1144.94

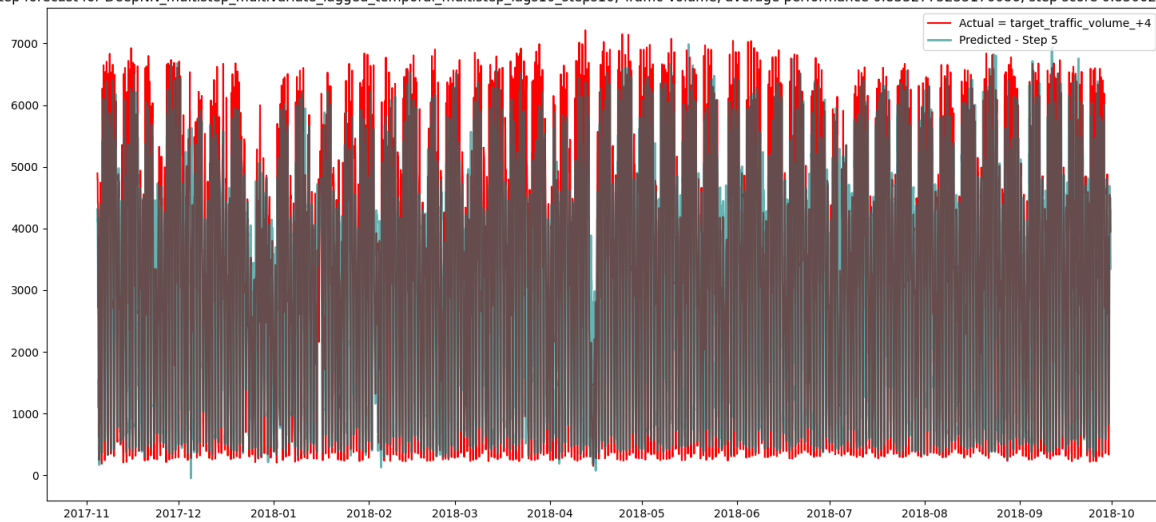**Malene Christiane Nielsen**
mniel@mmmi.sdu.dk
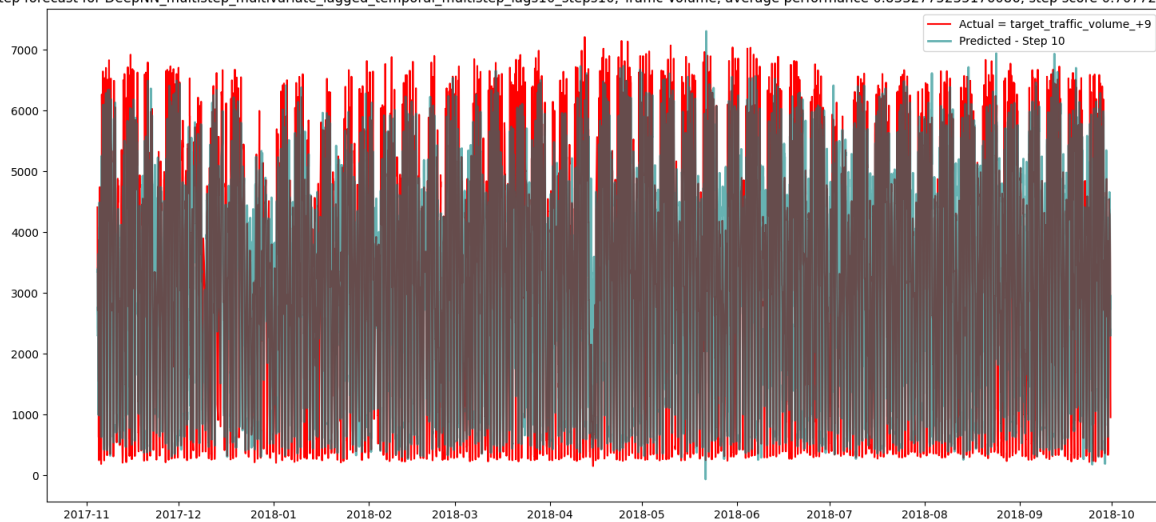
Steps plots for DeepNN forecasts over time

Multistep forecast for DeepNN_multistep_multivariate_lagged_temporal_multistep_lags10_steps10, Traffic Volume, average performance 0.8332775235176086, step score 0.9661677806747329
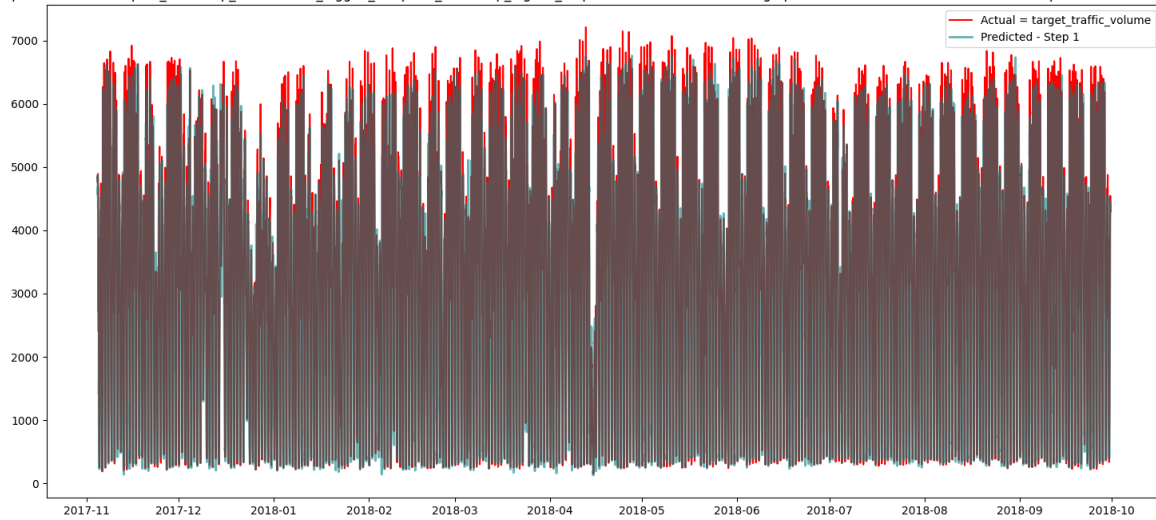
Multistep forecast for DeepNN_multistep_multivariate_lagged_temporal_multistep_lags10_steps10, Traffic Volume, average performance 0.8332775235176086, step score 0.8506241997479447

Multistep forecast for DeepNN_multistep_multivariate_lagged_temporal_multistep_lags10_steps10, Traffic Volume, average performance 0.8332775235176086, step score 0.7077272630710357
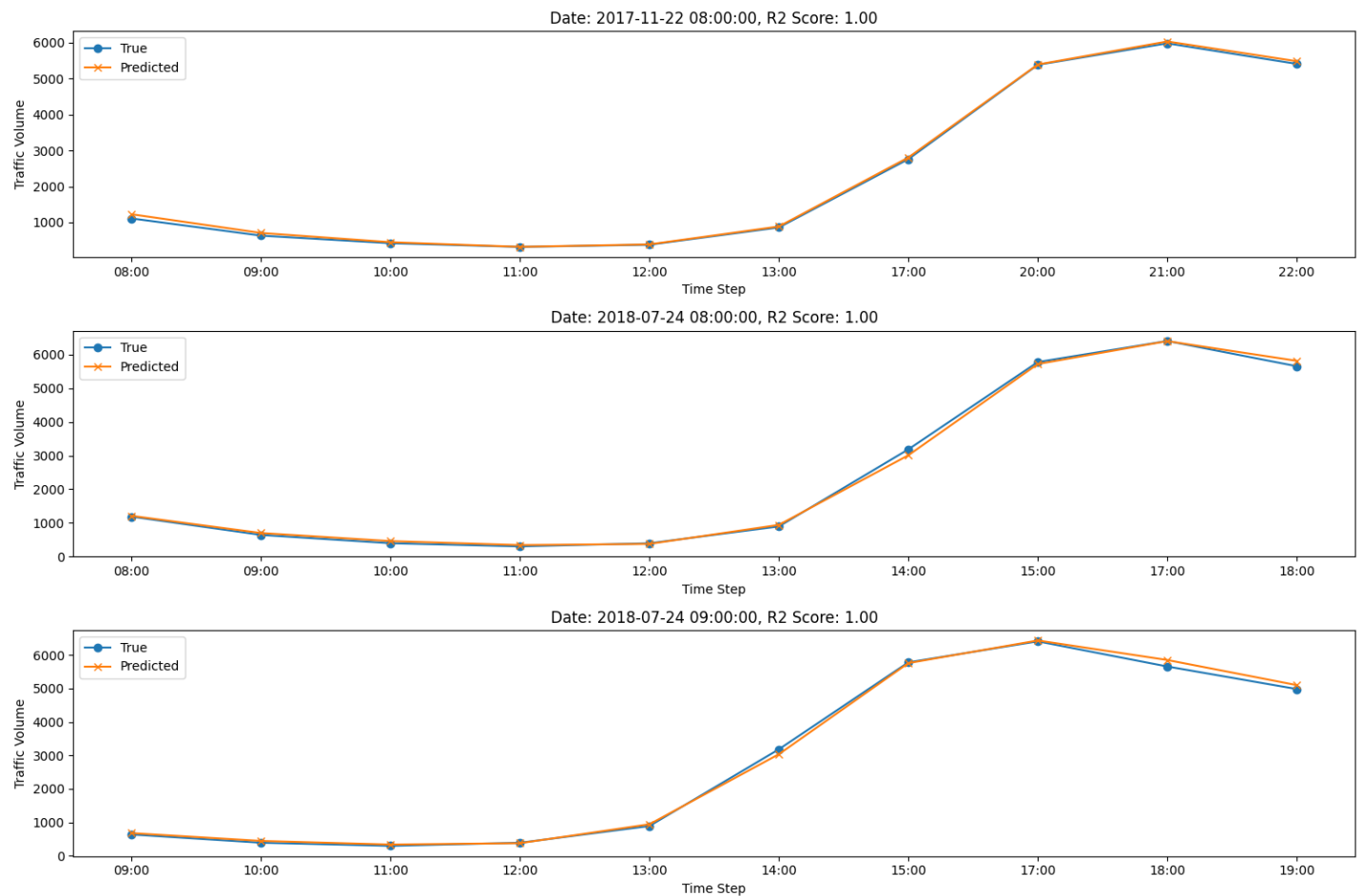
The best model for recursive forecasting.

The best model for recursive forecasting is the DeepNN model.
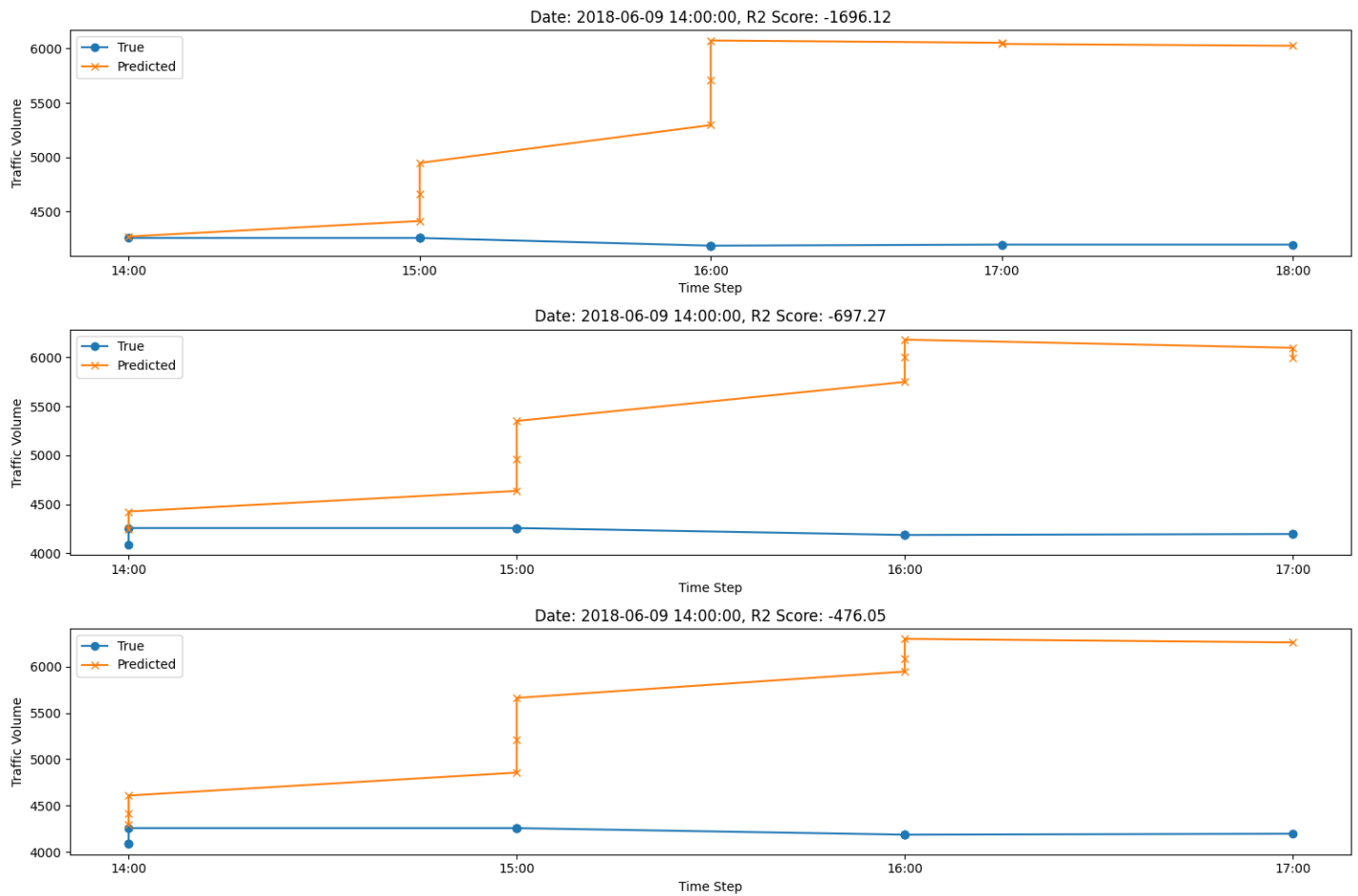The model has been trained on the multivariate_lagged_temporal_lags10 dataset.

The best score for the recursive forecasting is 0.7752858400344849.

Best predicted days for DeepNN.

Worst predicted days for DeepNN.

Date: 2018-06-09 14:00:00, R2 Score: -1696.12

Date: 2018-06-09 14:00:00, R2 Score: -697.27

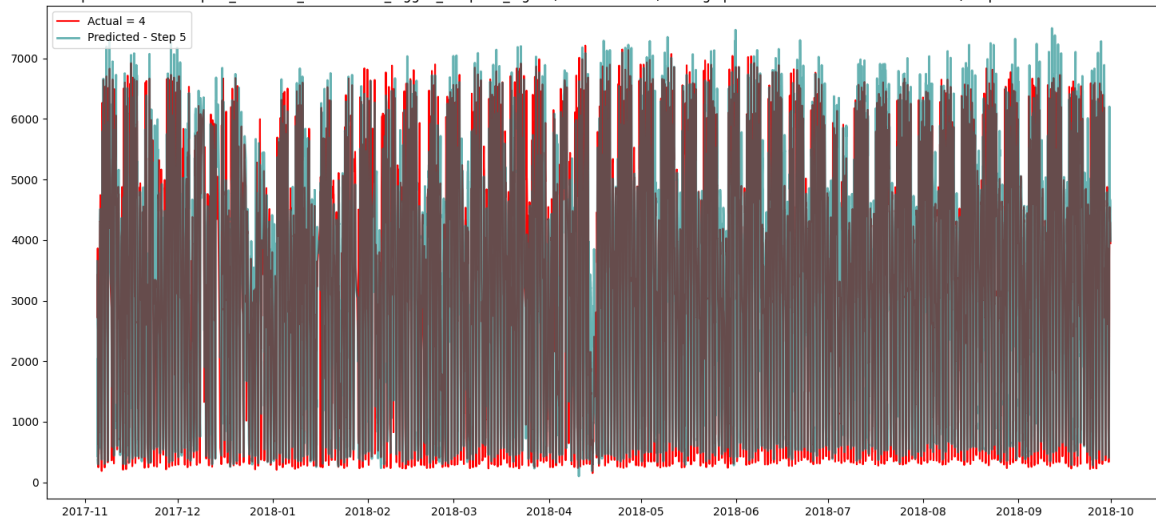Date: 2018-06-09 14:00:00, R2 Score: -476.05

Steps plots for DeepNN forecasts over time

Multistep forecast for DeepNN_recursive_multivariate_lagged_temporal_lags10, Traffic Volume, average performance 0.7752858400344849, step score 0.9670987868281261
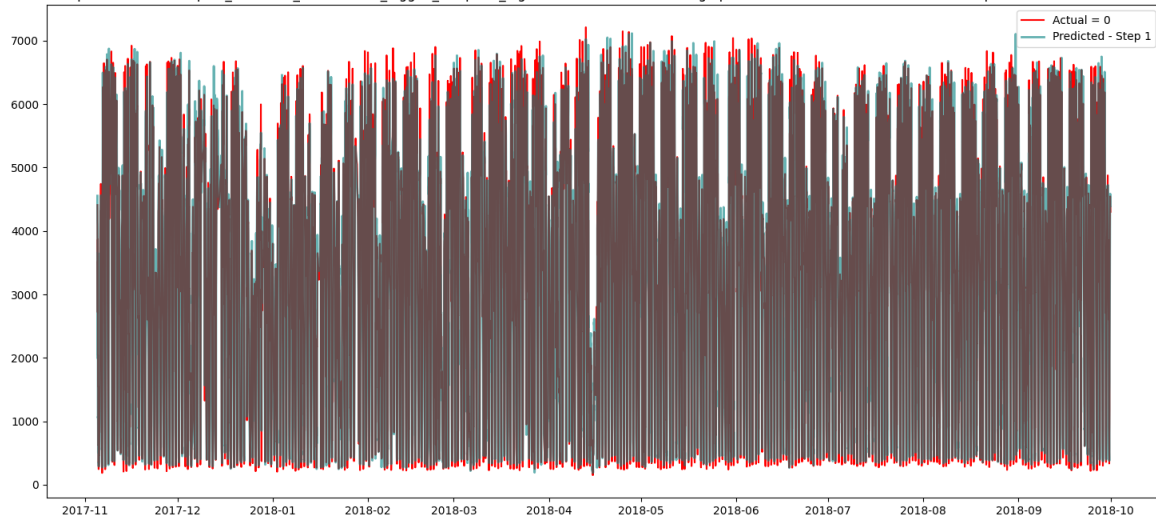
Multistep forecast for DeepNN_recursive_multivariate_lagged_temporal_lags10, Traffic Volume, average performance 0.7752858400344849, step score 0.790562805302786

Multistep forecast for DeepNN_recursive_multivariate_lagged_temporal_lags10, Traffic Volume, average performance 0.7752858400344849, step score 0.6094360150231027