

# Data Science Lab 6

<b>Team nr:</b> 2	<b>Student 1:</b> Åmund Grimstad	<b>IST nr:</b> 1116675
	<b>Student 2:</b> Arthur de Arruda Chau	<b>IST nr:</b> 1116090
	<b>Student 3:</b> Benjamin Raymond Kuhn	<b>IST nr:</b> 1115778
	<b>Student 4:</b> João Rafael Freitas Lourenço	<b>IST nr:</b> 425699

## FORECASTING MODELS

### Traffic Time Series

#### *Exponential Smoothing*

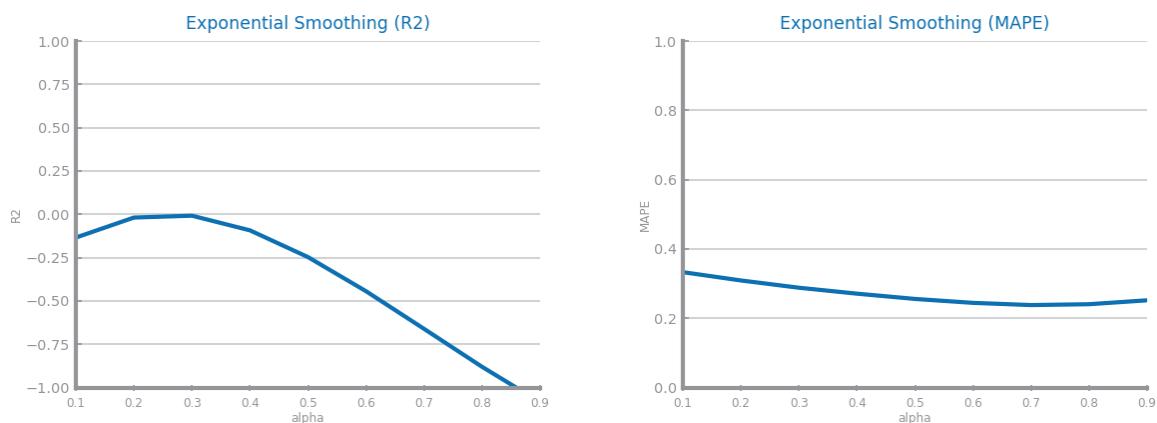


Figure 1: Exponential Smoothing R2 and MAPE study for Traffic Time Series

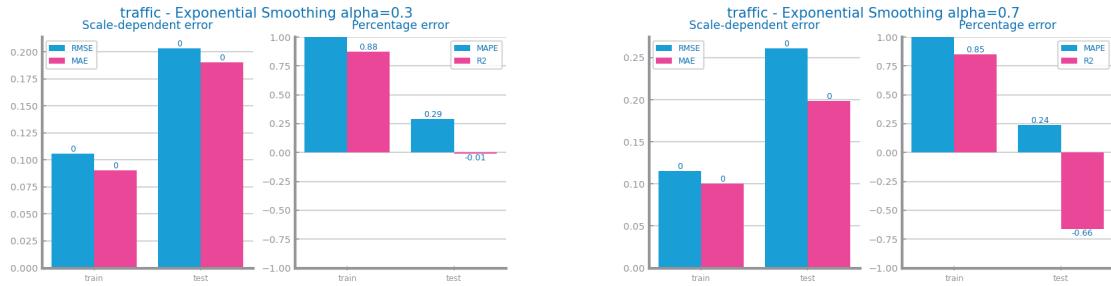


Figure 2: Exponential Smoothing R2 and MAPE evaluation results for Traffic Time Series



Figure 3: Exponential Smoothing R2 and MAPE forecasting for Traffic Time Series

### *Multi-layer Perceptron*

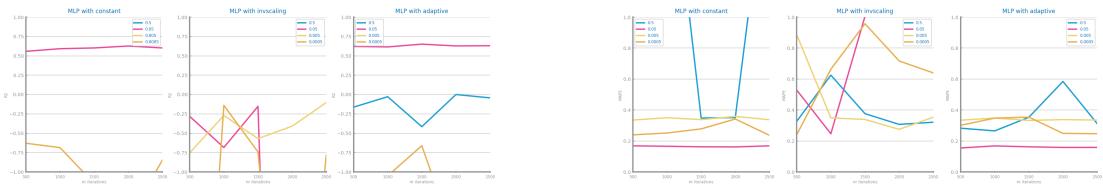


Figure 4: MLP R2 and MAPE study for Traffic Time Series

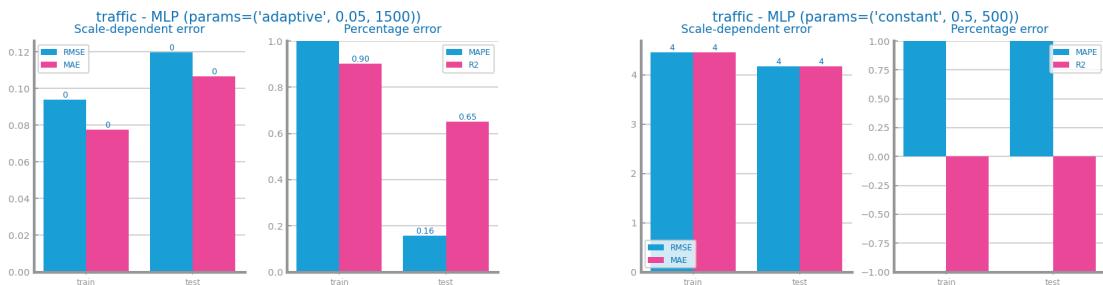


Figure 5: MLP R2 and MAPE evaluation results for Traffic Time Series



Figure 6: MLP R2 and MAPE forecasting for Traffic Time Series

## ARIMA

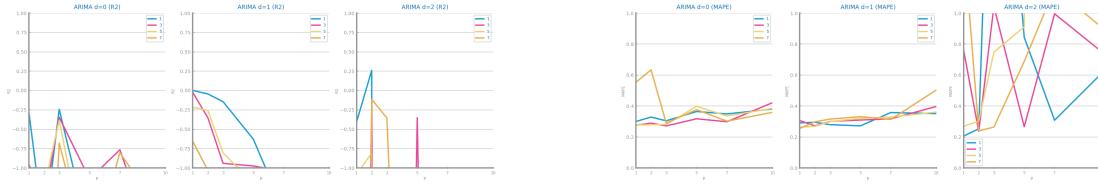


Figure 7: ARIMA R2 and MAPE study for Traffic Time Series

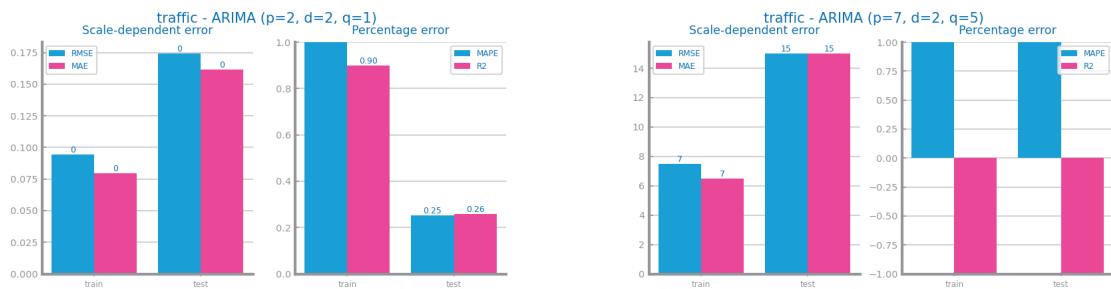


Figure 8: ARIMA R2 and MAPE evaluation results for Traffic Time Series



Figure 9: ARIMA R2 and MAPE forecasting for Traffic Time Series

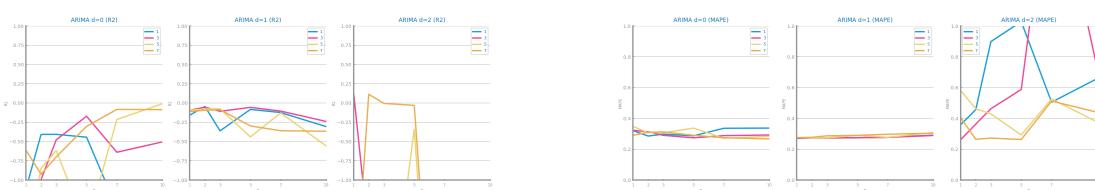


Figure 10: ARIMA with exogenous variables R2 and MAPE study for Traffic Time Series



Figure 11: ARIMA with exogenous variables R2 and MAPE evaluation results for Traffic Time Series

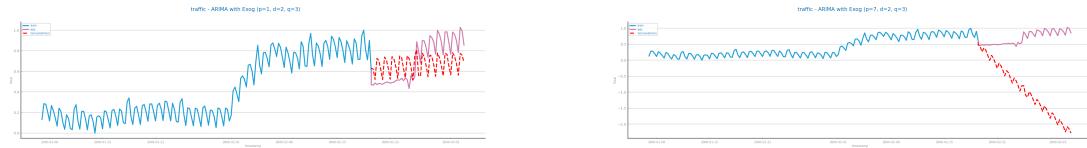


Figure 12: ARIMA with exogenous variables R2 and MAPE forecasting for Traffic Time Series

## LSTM

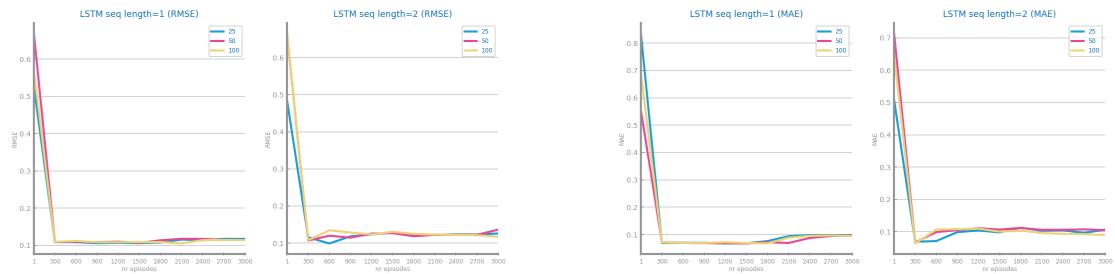


Figure 13: LSTM RMSE and MAE study for Traffic Time Series



Figure 14: LSTM RMSE and MAE evaluation results for Traffic Time Series

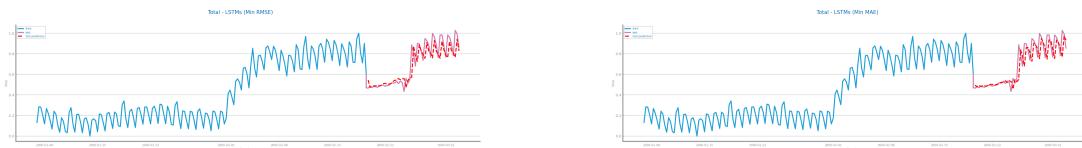


Figure 15: LSTM RMSE and MAE forecasting for Traffic Time Series

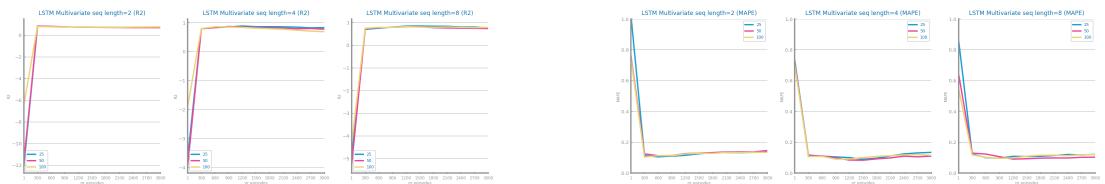


Figure 16: Multivariate LSTM R2 and MAPE study for Traffic Time Series



Figure 17: Multivariate LSTM R2 and MAPE evaluation results for Traffic Time Series



Figure 18: Multivariate LSTM R2 and MAPE forecasting for Traffic Time Series

# Inflation Rate Time Series

## Exponential Smoothing

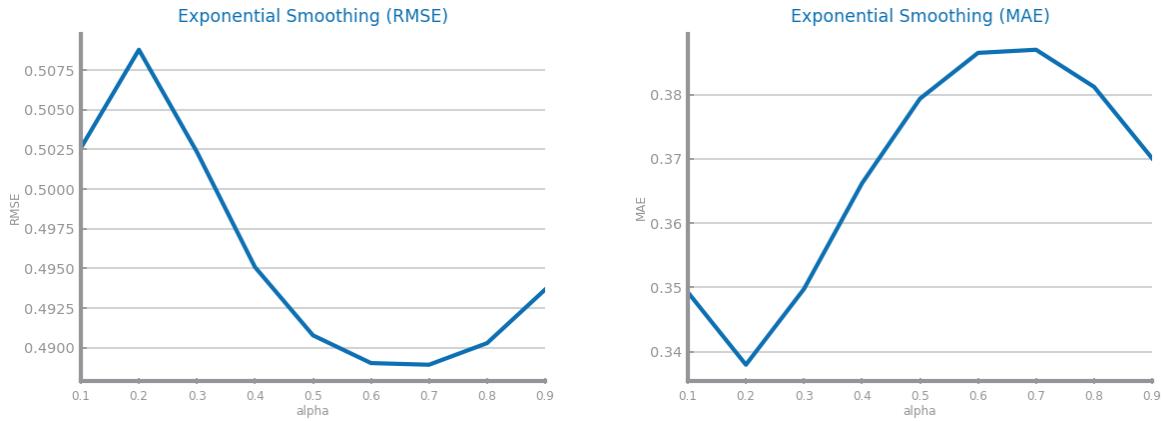


Figure 19: Exponential Smoothing RMSE and MAE study for Inflation Rate Time Series

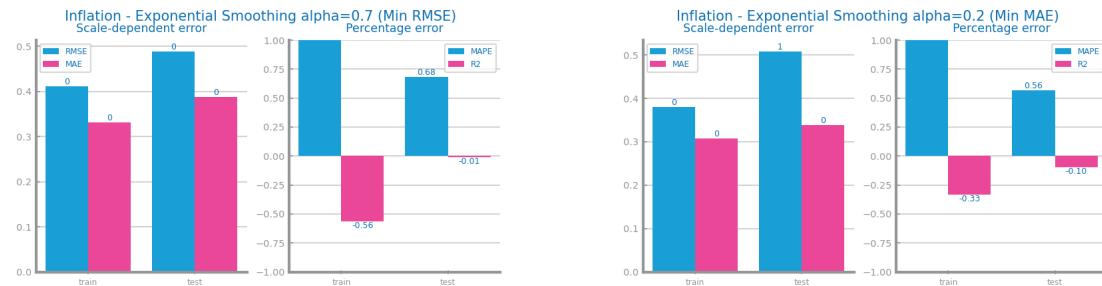


Figure 20: Exponential Smoothing RMSE and MAE evaluation results for Inflation Rate Time Series

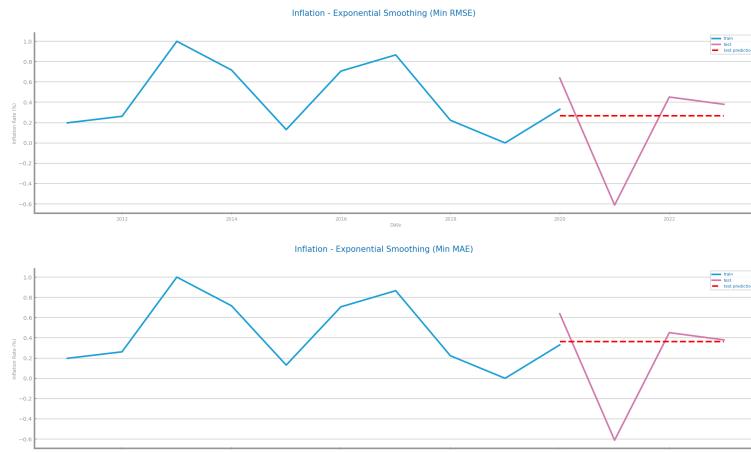


Figure 21: Exponential Smoothing RMSE and MAE forecasting for Inflation Rate Time Series

## Multi-layer Perceptron

Used a lag of k=4 (years)

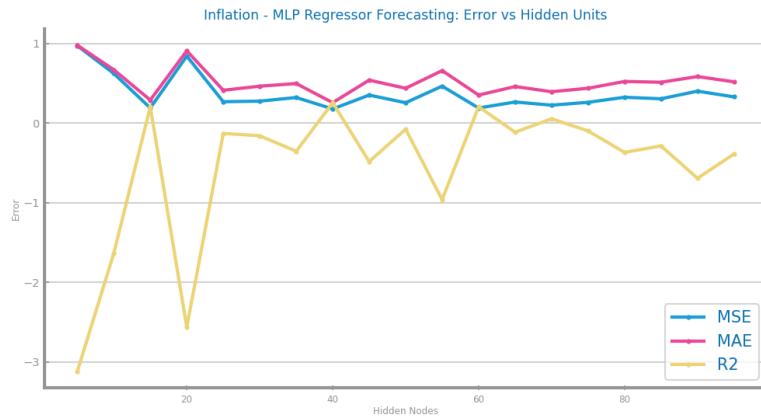


Figure 22: MLP RMSE, MAE and R2 study for Inflation Rate Time Series

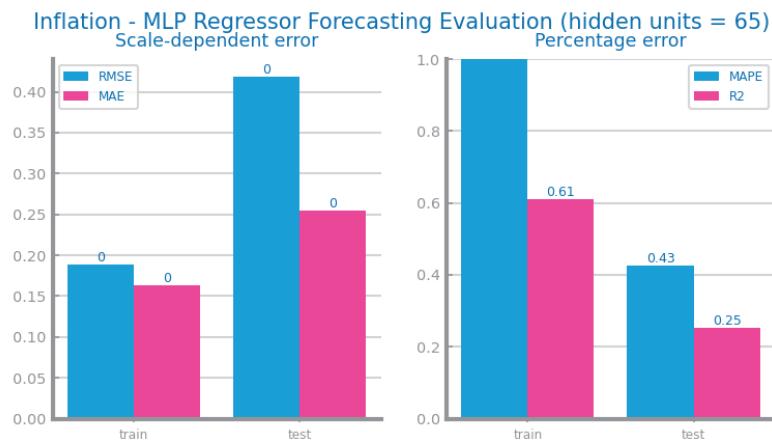


Figure 23: MLP R2 evaluation results for Inflation Rate Time Series

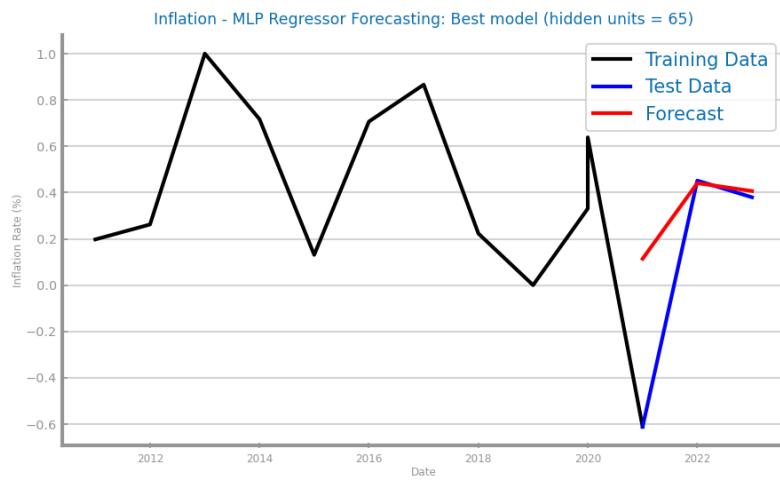


Figure 24: MLP Best model (based on R<sup>2</sup>) forecasting for Inflation Rate Time Series

## ARIMA

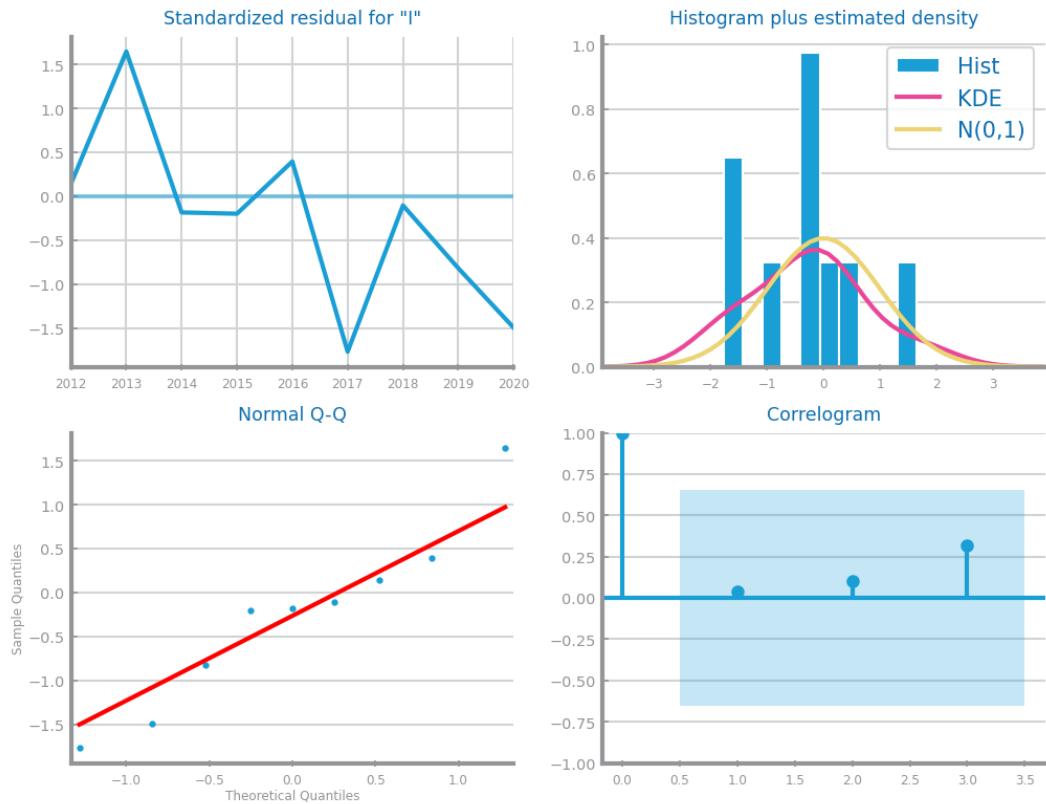


Figure 25: ARIMA diagnostics for Inflation Rate Time Series

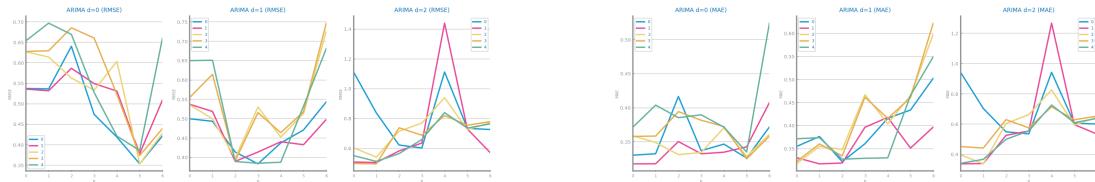


Figure 26: ARIMA RMSE and MAE study for Inflation Rate Time Series

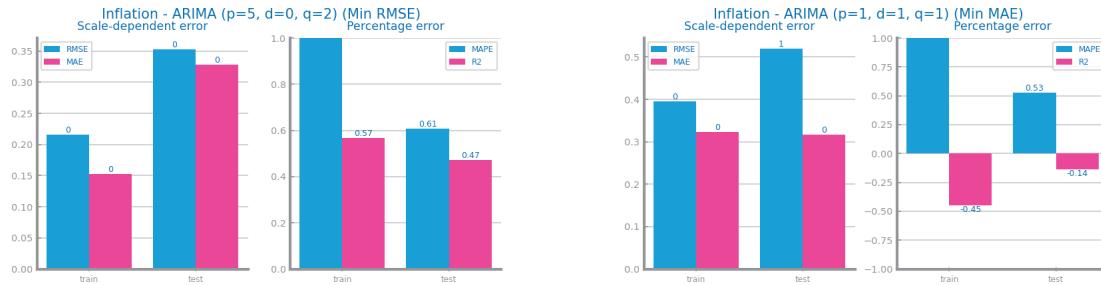


Figure 27: ARIMA RMSE and MAE evaluation results for Inflation Rate Time Series

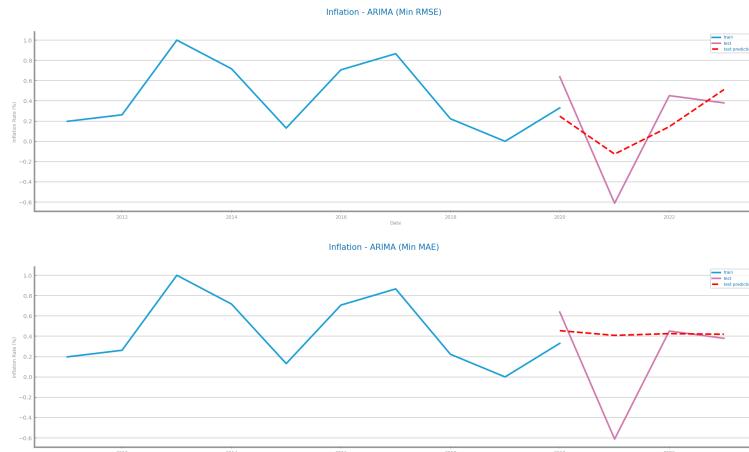


Figure 28: ARIMA RMSE and MAE forecasting for Inflation Rate Time Series

## LSTM

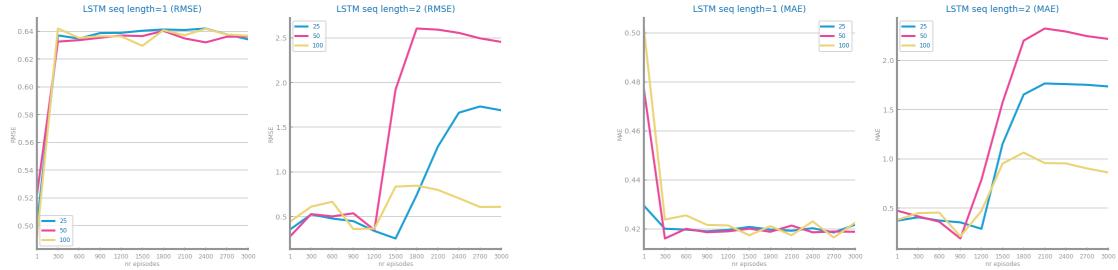


Figure 29: LSTM RMSE and MAE study for Inflation Rate Time Series

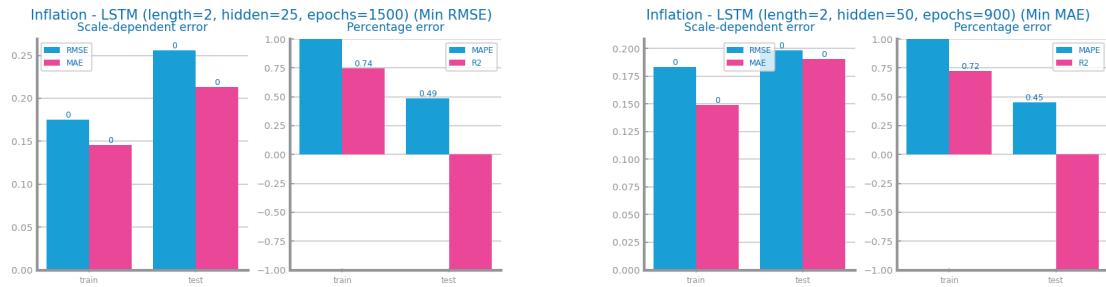


Figure 30: LSTM RMSE and MAE evaluation results for Inflation Rate Time Series

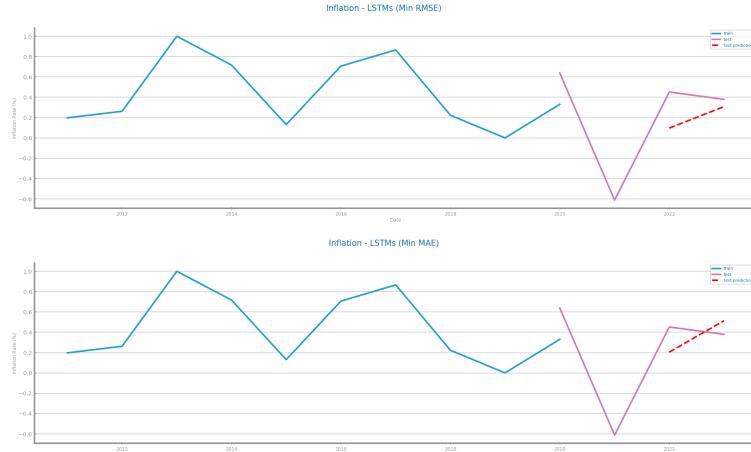


Figure 31: LSTM RMSE and MAE forecasting for Inflation Rate Time Series