

Assignment-8

Fuzzy Time Series Forecasting using Machine Learning

Each Question carries 22.5 Marks + Viva-Voce 10 Marks

1. Write a program to forecast the number of passengers travelling in an airline (The dataset is attached) using fuzzy time series forecasting employing Linear Regression model. Use 70-15-15% ratio in train-validation-test sets.
Specification: The universe of discourse (UOD) of time series is obtained by taking a practical 10% decrement and 10% increment on the minimum and maximum value of the time series. Once the UOD for the time series is identified, it is split into several equal length intervals. Set length of interval as 10. Then the time series is converted to a fuzzy time series by exchanging each observation of the time series by the index of the belonging interval of the observation. After the data is fuzzified, the high order fuzzy logical relationships (FLRs) are established. Here, the order of the fuzzy TSF model is set to 12. Then the FLRs are modelled using Linear Regression. Once the fuzzified forecasts are obtained, it is defuzzified and forecasting accuracy is measured.
2. Rewrite the question no. 1 employing LSTM model. The LSTM model has four layers: First Layer- Input Layer, Second Layer – LSTM Layer with 64 LSTM units, Third Layer – Fully Connected Layer with 32 neurons, Fourth Layer – Output Layer with single neuron. Repeat the simulations for 10 times and obtain the mean RMSE over 10 independent simulations.
3. Rewrite the question no. 1 employing GRU model. The GRU model has four layers: First Layer- Input Layer, Second Layer – GRU Layer with 64 GRU units, Third Layer – Fully Connected Layer with 32 neurons, Fourth Layer – Output Layer with single neuron. Repeat the simulations for 10 times and obtain the mean RMSE over 10 independent simulations.
4. Which among Q-1, Q-2 and Q-3 provide better result.