Assignment-7

Time Series Forecasting using Hybrid Models

Each Question carries 22.5 Marks + Viva-Voce 10 Marks

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1. In an additive hybrid model, the time series is first modelled using a linear model (Linear Regression, Huber Regression or Linear SVR). Then the linear model forecasts are subtracted from the time series data to obtain the residual series. The residual series is considered nonlinear and modelled using a nonlinear model (LSTM, or GRU). Then the final forecasts are obtained by adding the linear model forecasts with nonlinear model forecasts. Write a program using this additive hybrid model to forecast the number of passengers travelling in an airline. Use 70-15-15 % ratios in train, validation and test sets.
2. In a multiplicative hybrid model, the time series is first modelled using a linear model (Linear Regression, Huber Regression or Linear SVR). Then the linear model forecasts are divided from the time series data to obtain the residual series. The residual series is considered nonlinear and modelled using a nonlinear model (LSTM, or GRU). Then the final forecasts are obtained by multiplying the linear model forecasts with nonlinear model forecasts. Write a program using this multiplicative hybrid model to forecast the number of passengers travelling in an airline. Use 70-15-15 % ratios in train, validation and test sets.
3. Use additive STL decomposition to decompose the time series using seasonal, trend and residual components. Model the trend component using linear regression, seasonal component using LSTM and residual component using GRU. Using this decomposition based hybrid model forecast the number of passengers travelling in an airline. Use 70-15-15 % ratios in train, validation and test sets.
4. Use multiplicative STL decomposition to decompose the time series using seasonal, trend and residual components. Model the trend component using linear regression, seasonal component using LSTM and residual component using GRU. Using this decomposition based hybrid model forecast the number of passengers travelling in an airline. Use 70-15-15 % ratios in train, validation and test sets.