MA3832-Practical 6: LSTM model

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Goals

1. How to build a simple LSTM, a stacked LSTM for a time series

2. Conduct a forecasting using LSTM, stacked LSTM model, bidirectional LSTM

AUS Data

The dataset, `AUS.csv`, contains Gross Domestic Product of Australia from March-1959 to March-2019, quarterly. Your task is to **build a LSTM model to provide a forecast GDP of Australia.**

1. Split data into training data (the first 80%) and test data (the last 20%).

2. Conduct any data transformation if it is required

3. Construct a simple network with 2 time-steps, 2 layers of LSTM, each layers containing 20 units to fit the training data. Use `Adam` as an optimiser to estimate the model.

4. Use the function `predict()` to do prediction for the test dataset. Calculate root mean squared errors.

5. Conduct a recursive forecast on the test dataset

6. Repeat the exercises (3-4) for $\Delta GDP_t = GDP_t - GDP_{t-1}$. Comment on the forecast performance of LSTM on GDP

7. Repeat the exercise 6 for a bi-directional LSTM model with 2 layers of LSTM, 2 time-step and 10 units for each LSTM layer.

Air Passengers

The dataset, `AirPassengers.csv`, contains the number of air passengers per month from February-1949 to Dec-1960. Based on the previous exercise, you are ask to **build a LSTM model to predict the number of the monthly air passengers**.