Artificial Neural Network and Deep Learning

Homework 2: Time series Forecasting

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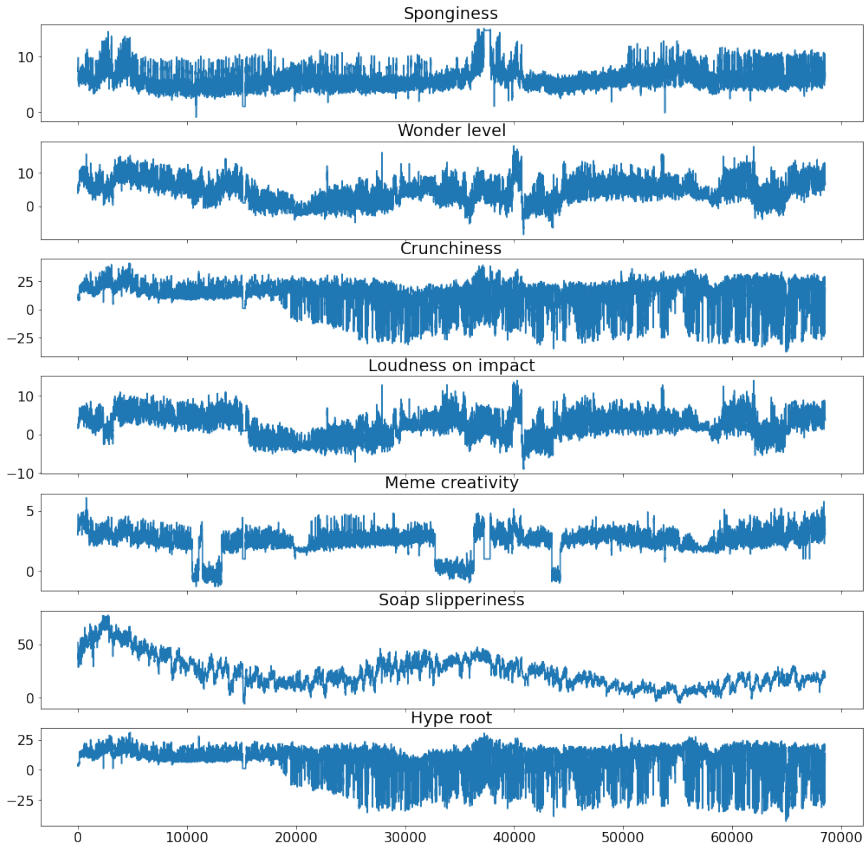
Firstly we approached the challenge analysing the data we were given.



As for pre-processing we normalised the time series using Min-Max Scaler. We also tried Z score normalisation but we obtained poorer results.

We then divided in train (5970) and test (830).

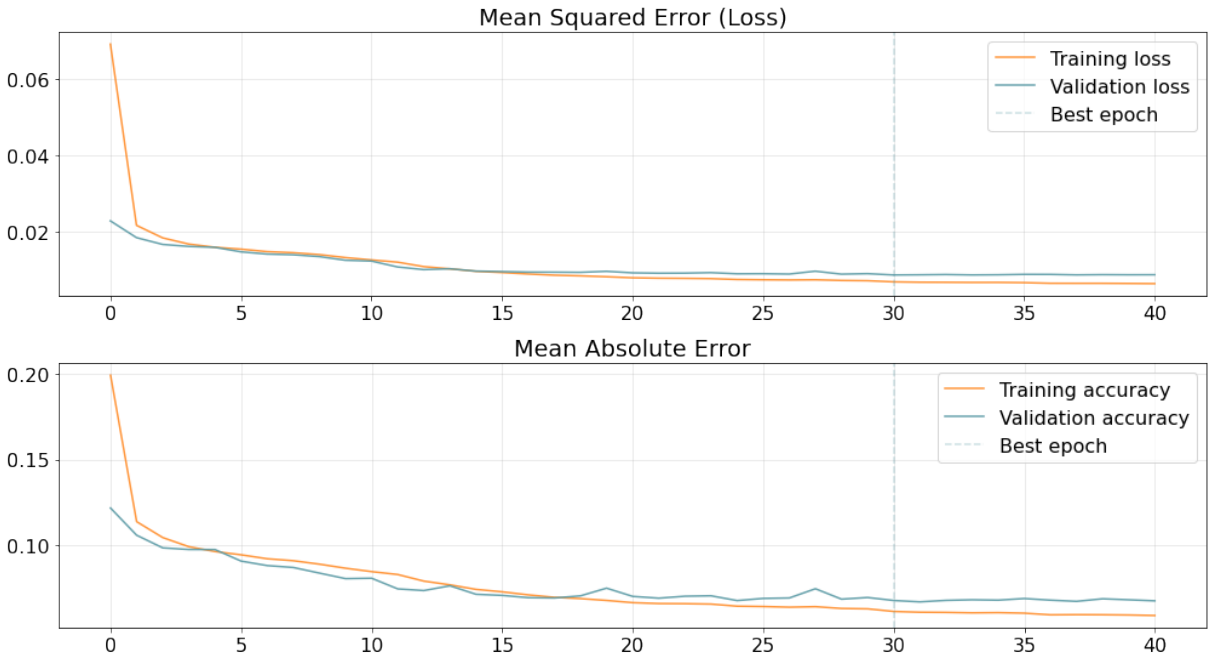
We built the neural network stacking several layer:

- 2 Bidirectional LSTM interleaved by a Convolutional and a MaxPooling Layer

- GlobalAvaragePooling Layer
- DropOut Layer to prevent overfitting
- A Dense, a Reshape and a Convolutional Layer in order to be able to make predictions for all the time series given

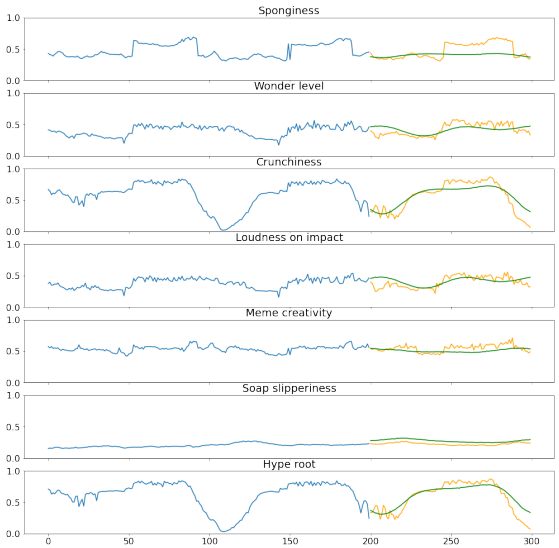
We also applied early stopping in order to stop the training at the best epoch and

ReduceLROnPlateau to dynamically modify the learning rate.



After couple attempt in which we tuned epochs and batch size we obtained rather good results on training and validation.

To actually have a feed back about the performances of our model we performed a prediction obtaining a Mean Squared Error of 0.009402241 and a Mean Absolute Error of 0.06900472. (results shown are with data normalised)



To obtain the required 864 prediction (1152 for the final phase), in the model file we implemented prediction and concatenation. Doing so we were able to set the window and telescope size to our will. After couple attempts we found the best performing values for these parameters.

In the end we de-normalised the result.