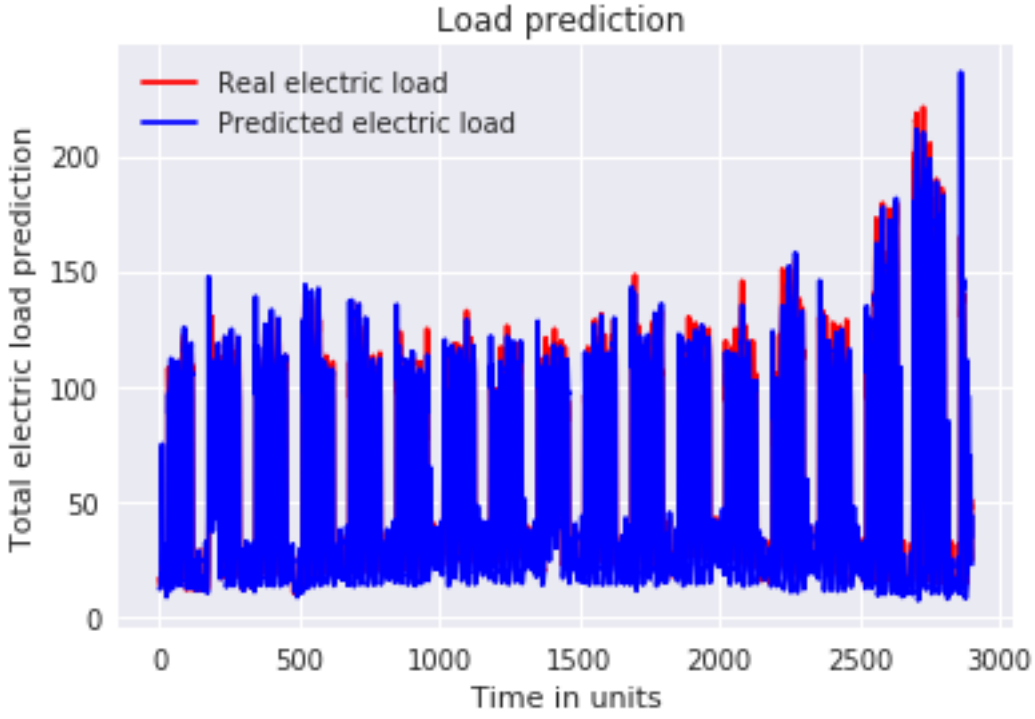
Household Electricity Load prediction

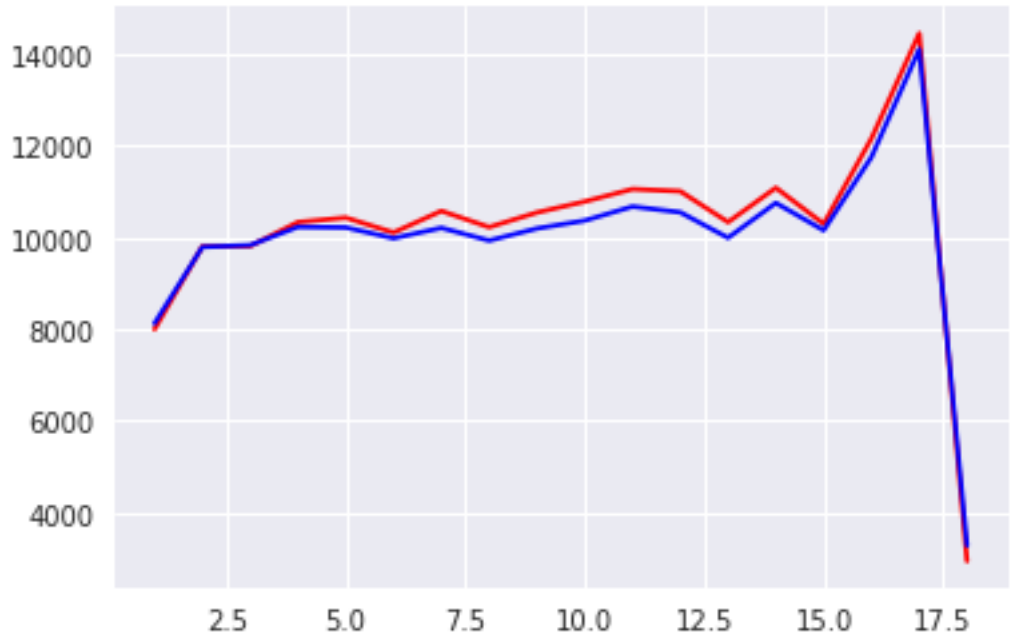
- The problem at hand is to determine the maximum, minimum of all the electricity loads and compare the consumption year -wise. The maximum electric load observed on: 2nd September 2016 with 343.2 KwH as total consumption and the minimum load was observed on: 16th September 2016 with peak consumption of 1.3 KwH, which is quite a variability in short span of time

- The year comparison of electric load is shown as follows (weekly-wise). We can easily observe the seasonality of the electric consumption and the fact that there is higher consumption of electricity during the summer months (assuming the location of house in northern hemisphere)

- The electric load prediction is done using a simple 4 stacked layers of LSTM. Many time series forecasting methods were tried (ARIMA, SARIMAX etc.) but the results weer not satisfactory. It is noted that LSTM can capture the seasonality of the data without additional method of making the data stationary. The code is briefly explained as follows:
    1. The data-set is first divided into test and training set. With the data of 2018 as the test set and the first two years as training set
    2. Further, the zeroth week is considered as the first 3 days of January 2016 . Week 1 starts from first monday of January 2016.
    3. Each LSTM layer is followed by a dropout layer to avoid over-fittting
    4. Data is standardized before training and is inverted when showing the final solutions

The 1st following figure shows the difference between real and predicted load per day while the 2nd shows per week (which is easy to visualize). The prediction catches the seasonality quite good.


Load prediction
Real electric load
Predicted electric load
Total electric load prediction
0
50
100
150
200
0
500
1000
1500
2000
2500
3000
Time in units


14000
12000
10000
8000
6000
4000
2.5
5.0
7.5
10.0
12.5
15.0
17.5