

Improving and Tuning the RNN - Solution

Please find in the zip folder at the bottom of this page the Solution of this Homework Challenge!

This folder contains the codes (python files) and the plot results (png images) for each of the four models.

Code explanations:

1. To add more timesteps, for example 20 timesteps, we need to create a 2D numpy array where each line corresponds to each time t , and for each line we have in columns the stock prices at times $t-20$, $t-19$, ..., $t-2$, and $t-1$. This 2D numpy array is `X_train`. Then we also create a 1D array with the outputs, which are the stock prices at time t . This 1D array is `y_train`. We do all this in the following part of the code:

```
1 | # Creating a data structure with 20 timesteps and t+1 output
2 | X_train = []
3 | y_train = []
4 | for i in range(20, 1258):
5 |     X_train.append(training_set_scaled[i-20:i, 0])
6 |     y_train.append(training_set_scaled[i, 0])
7 | X_train, y_train = np.array(X_train), np.array(y_train)
```

2. Then we reshape `X_train`, still to get this 3D array format that is expected by the fit and predict methods:

```
X_train = np.reshape(X_train, (X_train.shape[0],
X_train.shape[1], 1))
```

In this line of code, `X_train.shape[0]` is the number of observations (lines) in `X_train` and `X_train.shape[1]` is the number of timesteps (columns) in `X_train`. Then the third argument is a 1 because we still have one feature, since indeed we only have one indicator (the Google Stock Price). We could use another indicator like the S&P500 index or other indexes and in that case this third parameter would be 2.

3. For the models where we add more LSTM layers you'll notice this new parameter in the LSTM class:

```
return_sequences = True
```

This is a required parameter that must be set to True when stacking two LSTM layers. Basically that's simple, you just have to include `return_sequences = True` in your LSTM class if your next layer is an LSTM layer. However if your next layer is a fully connected layer (created with the Dense class), then make sure to remove `return_sequences = True` from the parameters of the LSTM class.

Congratulations to those of you who got the same results as in the folder, and also to those of you who tried hard.

Enjoy Deep Learning!

Resources for this lecture

 [Homework_Challenge.zip](#)