In [1]:
```
%config InlineBackend.figure_format = 'retina'
```

Individual predictor training - Horizon: 30 datapoints

This Jupyter notebook is the second out of three notebooks that are used to train the individual predictors to benchmark the system performance. In total, 15 individual predictors will be trained on stock and index data. For the benchmarking process, predictors from the predictorsI.py and predictorsII.py are trained. Each predictor will be served with an input batch that is used to dertmine the forecast estimation. The input size will be set at 20 data points (20 trading days). Furthermore, 3 forecasting horizions are considered: 5, 30 and 60 datapoints into the future.

In [2]:
```
%run ../tools/dataloader.py
%run ../tools/predictorsI.py
%run ../tools/predictorsIII.py
```

Dataset

The second dataset used is the stock price of BP p.l.c. (BP). Prices are in USD and listed on NYSE - Nasdaq. The data is extracted via the Yahoo Finance API accessed via the pandas data reader function. The adjusting closing price was used to train the following predictors.

Link to website: https://uk.finance.yahoo.com/quote/BP/history?p=BP

In [3]:
```
data = DataLoader('BP', '2010-01-01', '2018-01-01')
prices = data.get_adjclose()
```

In [4]:
```
print(data)
```

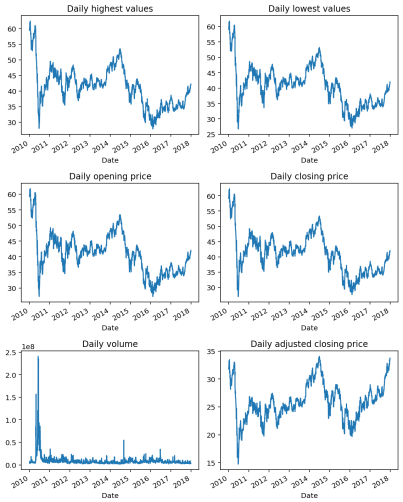
```
Total count of rows: 2013
Ticker: BP
Start: 2010-01-01
End: 2018-01-01
```

In [5]:
```
data.statistics()
```

Out[5]:

	High	Low	Open	Close	Volume	Adj Close
count	2013.000000	2013.000000	2013.000000	2013.000000	2.013000e+03	2013.000000
mean	41.293115	40.678763	40.989399	40.999548	8.825362e+06	25.920763
std	6.278512	6.272534	6.276666	6.282801	1.408643e+07	3.292094
min	27.850000	26.750000	27.309999	27.020000	1.724500e+06	14.737371
25%	36.290001	35.750000	36.020000	36.029999	4.643400e+06	24.048178
50%	41.549999	41.049999	41.250000	41.310001	6.177400e+06	25.596903
75%	44.639999	44.000000	44.250000	44.290001	8.699700e+06	27.748432
max	62.380001	61.759998	61.759998	62.320000	2.408085e+08	34.085224

In [6]:
```
data.plotting_grid()
```



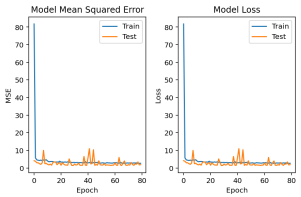
In [7]:
```
predictor6 = BasicUnivariatePredictor(20, 30, prices)
predictor6.create_lstm()
predictor6.model_blueprint()
```

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
lstm (LSTM)                  (None, 20, 40)            6720
_________________________________________________________________
lstm_1 (LSTM)                (None, 20, 50)            18200
_________________________________________________________________
lstm_2 (LSTM)                (None, 50)                20200
_________________________________________________________________
dense (Dense)                (None, 30)                1530
=================================================================
Total params: 46,650
Trainable params: 46,650
Non-trainable params: 0
_________________________________________________________________
```

In [8]:
```
predictor6.fit_model(80, 0)
```


Out[8]:
```
<tensorflow.python.keras.callbacks.History at 0x1b52e0178b0>
```

In [9]:
```
predictor6.show_performance()
```



In [10]:
```
predictor6.save_model()
```

```
WARNING:tensorflow:From C:\Users\Max\Anaconda3\envs\sys\lib\site-packages\tensorflow\python\training\tracking\tracking.py:111: Model.state_updates (from tensorflow.python.keras.engine.training) is deprecated and will be removed in a future version.
Instructions for updating:
This property should not be used in TensorFlow 2.0, as updates are applied automatically.
WARNING:tensorflow:From C:\Users\Max\Anaconda3\envs\sys\lib\site-packages\tensorflow\python\training\tracking\tracking.py:111: Layer.updates (from tensorflow.python.keras.engine.base_layer) is deprecated and will be removed in a future version.
Instructions for updating:
This property should not be used in TensorFlow 2.0, as updates are applied automatically.
INFO:tensorflow:Assets written to: C:\Users\Max\Documents\GitHubPrivate\arguing-predictors\notebooks\assets
```

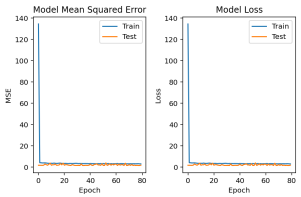
In [11]:
```
predictor7 = BasicUnivariatePredictor(20, 30, prices)
predictor7.create_mlp()
predictor7.model_blueprint()
```

```
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_1 (Dense)              (None, 50)                1050
_________________________________________________________________
dense_2 (Dense)              (None, 25)                1275
_________________________________________________________________
dense_3 (Dense)              (None, 25)                650
_________________________________________________________________
dense_4 (Dense)              (None, 30)                780
=================================================================
Total params: 3,755
Trainable params: 3,755
Non-trainable params: 0
_________________________________________________________________
```

In [12]:
```
predictor7.fit_model(80, 0)
```

Out[12]:
```
<tensorflow.python.keras.callbacks.History at 0x1b536a569a0>
```

In [13]:
```
predictor7.show_performance()
```



In [14]:
```
predictor7.save_model()
```

```
INFO:tensorflow:Assets written to: C:\Users\Max\Documents\GitHubPrivate\arguing-predictors\notebooks\assets
```

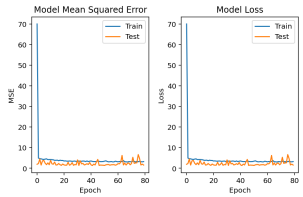
In [15]:
```
predictor8 = BasicUnivariatePredictor(20, 30, prices)
predictor8.create_cnn()
predictor8.model_blueprint()
```

```
Model: "sequential_2"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv1d (Conv1D)              (None, 19, 64)            192
_________________________________________________________________
conv1d_1 (Conv1D)            (None, 18, 32)            4128
_________________________________________________________________
max_pooling1d (MaxPooling1D) (None, 9, 32)             0
_________________________________________________________________
flatten (Flatten)            (None, 288)               0
_________________________________________________________________
dense_5 (Dense)              (None, 50)                14450
_________________________________________________________________
dense_6 (Dense)              (None, 30)                1530
=================================================================
Total params: 20,300
Trainable params: 20,300
Non-trainable params: 0
_________________________________________________________________
```

In [16]:
```
predictor8.fit_model(80, 0)
```

Out[16]:
```
<tensorflow.python.keras.callbacks.History at 0x1b53ee544f0>
```

In [17]:
```
predictor8.show_performance()
```



In [18]:
```
predictor8.save_model()
```

```
INFO:tensorflow:Assets written to: C:\Users\Max\Documents\GitHubPrivate\arguing-predictors\notebooks\assets
```

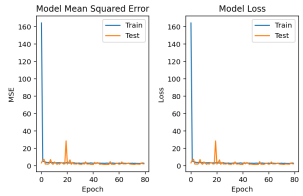
In [19]:
```
predictor9 = BasicUnivariatePredictor(20, 30, prices)
predictor9.create_bilstm()
predictor9.model_blueprint()
```

```
Model: "sequential_3"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
bidirectional (Bidirectional (None, 20, 100)           20800
_________________________________________________________________
lstm_4 (LSTM)                (None, 50)                30200
_________________________________________________________________
dense_7 (Dense)              (None, 30)                1530
=================================================================
Total params: 52,530
Trainable params: 52,530
Non-trainable params: 0
_________________________________________________________________
```

In [20]:
```
predictor9.fit_model(80, 0)
```

Out[20]:
```
<tensorflow.python.keras.callbacks.History at 0x1b53539fc40>
```

In [21]:
```
predictor9.show_performance()
```



In [22]:
```
predictor9.save_model()
```

```
INFO:tensorflow:Assets written to: C:\Users\Max\Documents\GitHubPrivate\arguing-predictors\notebooks\assets
```

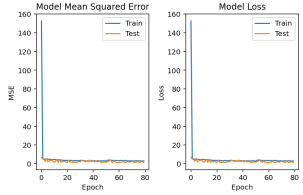
In [23]:
```
predictor10 = HybridUnivariatePredictor(2, 20, 30, prices)
predictor10.create_cnnlstm()
predictor10.model_blueprint()
```

```
Model: "sequential_4"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
time_distributed (TimeDistri (None, None, 9, 64)       192
_________________________________________________________________
time_distributed_1 (TimeDist (None, None, 8, 32)       4128
_________________________________________________________________
time_distributed_2 (TimeDist (None, None, 4, 32)       0
_________________________________________________________________
time_distributed_3 (TimeDist (None, None, 128)         0
_________________________________________________________________
lstm_5 (LSTM)                (None, None, 50)          35800
_________________________________________________________________
lstm_6 (LSTM)                (None, 25)                7600
_________________________________________________________________
dense_8 (Dense)              (None, 30)                780
=================================================================
Total params: 48,500
Trainable params: 48,500
Non-trainable params: 0
_________________________________________________________________
```

In [24]:
```
predictor10.fit_model(80, 0)
```

Out[24]:
```
<tensorflow.python.keras.callbacks.History at 0x1b53ff96610>
```

In [25]:
```
predictor10.show_performance()
```



In [26]:
```
predictor10.save_model()
```

```
INFO:tensorflow:Assets written to: C:\Users\Max\Documents\GitHubPrivate\arguing-predictors\notebooks\assets
```


6/3/2021 ModelTraining2

localhost:8888/nbconvert/html/Documents/GitHubPrivate/arguing-predictors/notebooks/ModelTraining2.ipynb?download=false