visualisation_est_2

March 29, 2020

1 Visualisation of estimations in ML experiments Group A

Done on LDPRF 2098.

1.0.1 Import necessary libraries

[1]:
```
import numpy as np
import pandas as pd
import copy
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers

# import codebase
import thermalModel_main as tmm
import thermalModel_groupB as tm_gb

import importlib
importlib.reload(tmm)
importlib.reload(tm_gb)
```

```
Using TensorFlow backend.
```

[1]:
```
<module 'thermalModel_groupB' from
'C:\\Users\\user\\Anaconda3\\lib\\thermalModel_groupB.py'>
```

1.1 ANN Ah Model

1.1.1 Data loading and cleaning

[2]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list = ['runtime_s','AhCha','AhDch','Amb','Temp'],
                    mode = 0)
```

```
C:\Users\user\Anaconda3\lib\thermalModel_groupB.py:47: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame
```

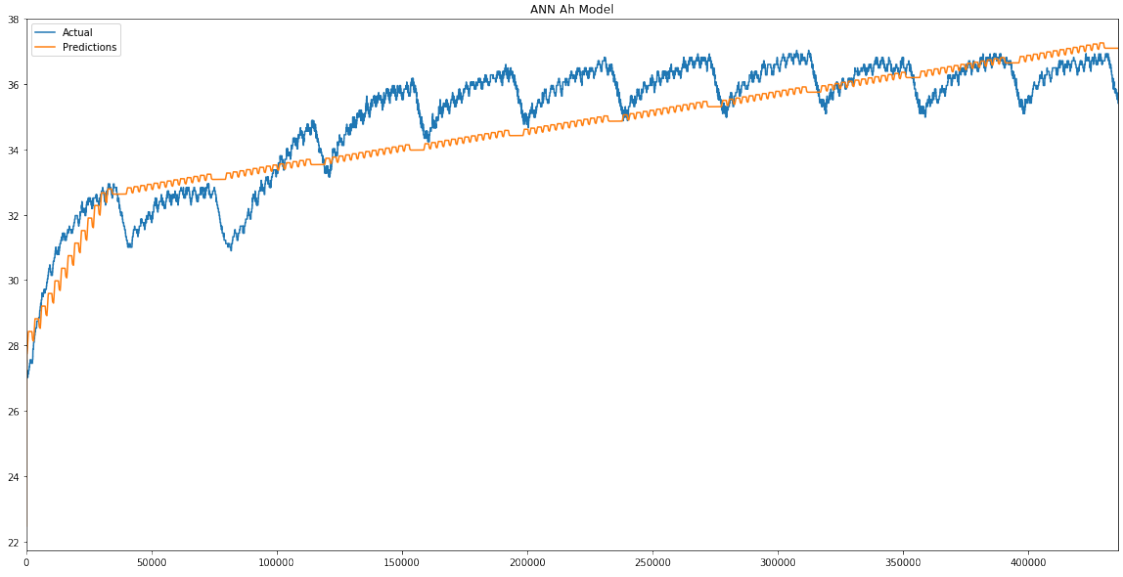
```
See the caveats in the documentation: http://pandas.pydata.org/pandas-
docs/stable/indexing.html#indexing-view-versus-copy
  df['second'][set_index[index]:set_index[index+1]] =
df['second'][set_index[index]:set_index[index+1]] + second_increment[index]
C:\Users\user\Anaconda3\lib\thermalModel_groupB.py:49: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-
docs/stable/indexing.html#indexing-view-versus-copy
  df['second'][set_index[index]:] = df['second'][set_index[index]:] +
second_increment[index]
C:\Users\user\Anaconda3\lib\thermalModel_groupB.py:56: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-
docs/stable/indexing.html#indexing-view-versus-copy
  df['second'][set_index[index]:] = df['second'][set_index[index]:] +
seconds_summation[index]
```

[3]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('ANN_full_size_Ah_model_1' + '.h5')
_ = tmm.predictions_plot(model_name = "ANN Ah Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```



1.2 ANN IV Model

1.2.1 Data loading and cleaning

[4]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list =␣
↪['runtime_s','Current','Voltage','Amb','Temp'],
                    mode = 1)
```

[5]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('ANN_full_size_IV_model_1' + '.h5')
_ = tmm.predictions_plot(model_name = "ANN IV Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```

1.3 ANN Hybrid Model

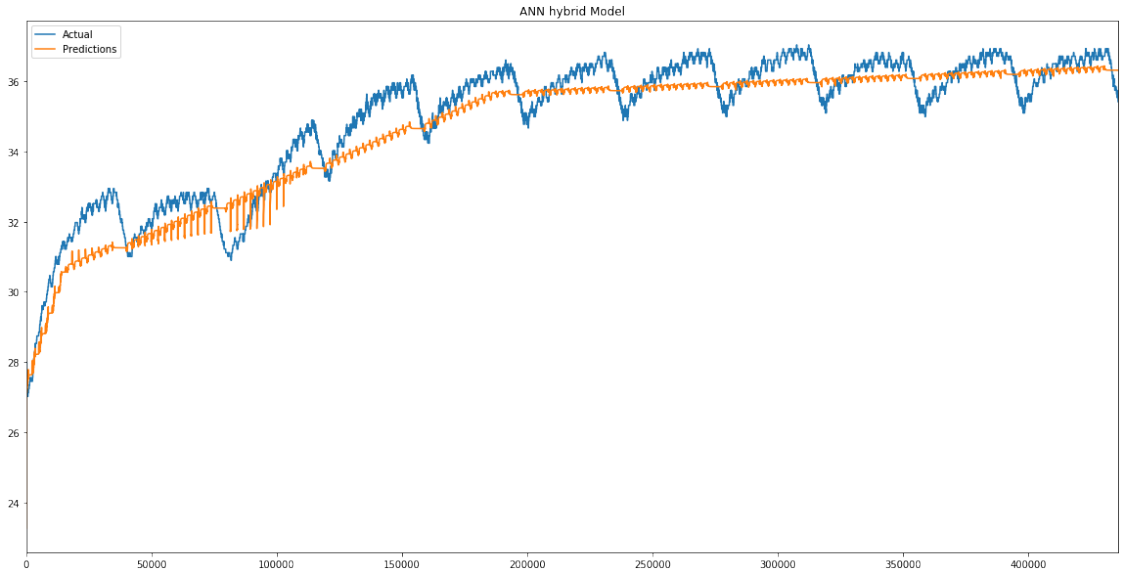
1.3.1 Data loading and cleaning

[6]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list =␣
↪['runtime_s','Current','Voltage','AhCha','AhDch','Amb','Temp'],
                    mode = 2)
```

[7]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('ANN_full_size_hybrid_model_1' + '.h5')
```

```
_ = tmm.predictions_plot(model_name = "ANN hybrid Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```



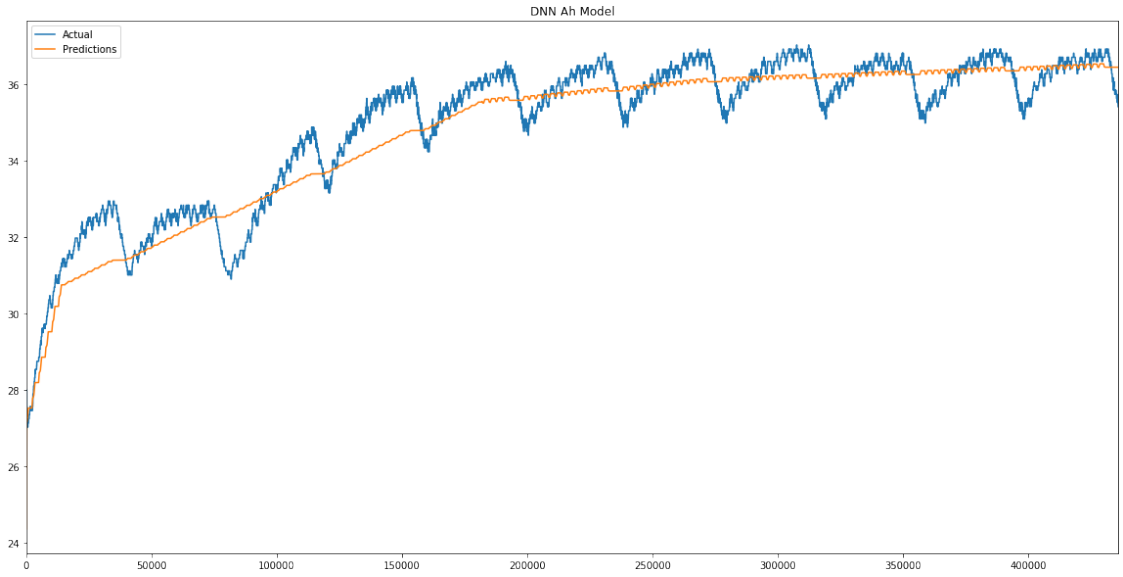
1.4 DNN Ah Model

1.4.1 Data loading and cleaning

[8]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list = ['runtime_s','AhCha','AhDch','Amb','Temp'],
                    mode = 0)
```

[9]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('DNN_full_size_Ah_model_1' + '.h5')
_ = tmm.predictions_plot(model_name = "DNN Ah Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```



1.5 DNN IV Model

1.5.1 Data loading and cleaning

[10]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list =␣
 ↪['runtime_s','Current','Voltage','Amb','Temp'],
                    mode = 1)
```

[11]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('DNN_full_size_IV_model_1' + '.h5')
_ = tmm.predictions_plot(model_name = "DNN IV Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```

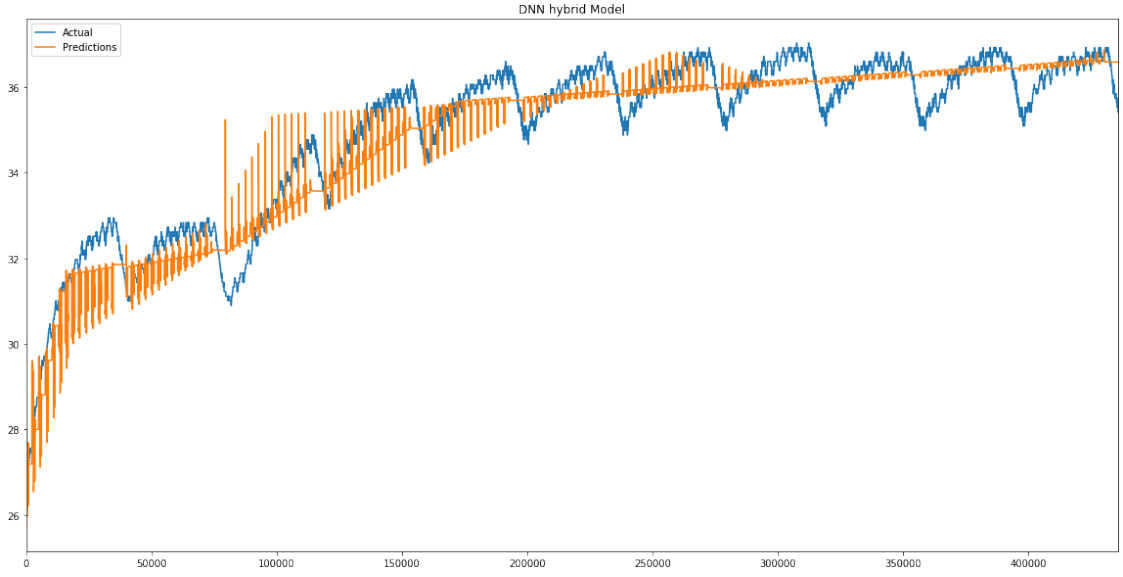
1.6 DNN Hybrid Model

1.6.1 Data loading and cleaning

[12]:
```
df = tm_gb.load_csv(filename = 'LDPRF_2098.csv',
                    features_list =␣
 ↪['runtime_s','Current','Voltage','AhCha','AhDch','Amb','Temp'],
                    mode = 2)
```

[13]:
```
df = df.drop(columns=['runtime_s'])

ML_model = tf.keras.models.load_model('DNN_full_size_hybrid_model_1' + '.h5')
_ = tmm.predictions_plot(model_name = "DNN hybrid Model",
                         dataframe_entry = df,
                         model = ML_model,
                         window_size = 1,
                         plot_errors = True)
```


DNN hybrid Model
Actual
Predictions
36
34
32
30
28
26
0
50000
100000
150000
200000
250000
300000
350000
400000