fashion-forecasting

September 29, 2021

[1]:
```
import tensorflow as tf
import numpy as np
import pandas as pd
from datetime import datetime
from datetime import timedelta
```

[2]:
```
df = pd.read_csv('fashion.csv')
df.head()
```

[2]:

	date	Cami Dresses	Shirts	Tote Bags	Sneakers	Crop Tops	Polos	Cross Body Bags	Casual Jackets	Swimwear Bottoms	…	Heels	T-Shirts	Activewear Tops & T-Shirts	Watches & Timepieces	Wallets & Card Holders	Bodycon Dresses	Beauty Tools & Accessories
0	2017-08-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	1.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2017-08-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	1.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2017-08-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	1.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2017-08-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	1.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2017-08-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	1.0	0.0	0.0	0.0	0.0	0.0	0.0

```
   Skinny Jeans  Beauty Eyes  Beauty Face
0           0.0          0.0          0.0
1           0.0          0.0          0.0
2           0.0          0.0          0.0
3           0.0          0.0          0.0
4           0.0          0.0          0.0

[5 rows x 46 columns]
```

[3]:
```
date_ori = pd.to_datetime(df.iloc[:, 0]).tolist()
df = df.iloc[:,1:]
df_copy = df.copy()
```

[4]:
```
num_layers = 1
learning_rate = 0.01
size_layer = 128
timestamp = 5
epoch = 500
dropout_rate = 0.7
future_weeks = 30
```

[5]:
```
class Model:
    def __init__(self, learning_rate, num_layers,
                 size, size_layer, forget_bias = 0.8):

        def lstm_cell(size_layer):
            return tf.nn.rnn_cell.LSTMCell(size_layer, state_is_tuple = False)
        rnn_cells = tf.nn.rnn_cell.MultiRNNCell([lstm_cell(size_layer) for _ in␣
↪range(num_layers)],
                                                state_is_tuple = False)
        self.X = tf.placeholder(tf.float32, (None, None, size))
        self.Y = tf.placeholder(tf.float32, (None, size))
        drop = tf.contrib.rnn.DropoutWrapper(rnn_cells, output_keep_prob =␣
↪forget_bias)
        self.hidden_layer = tf.placeholder(tf.float32,
                                           (None, num_layers * 2 * size_layer))
        self.outputs, self.last_state = tf.nn.dynamic_rnn(drop, self.X,
                                                          initial_state = self.
↪hidden_layer,
                                                          dtype = tf.float32)
        self.logits = tf.layers.dense(self.outputs[-1],size,
                         kernel_initializer=tf.glorot_uniform_initializer())
        self.cost = tf.reduce_mean(tf.nn.
↪sigmoid_cross_entropy_with_logits(labels=self.Y,logits=self.logits))
        self.optimizer = tf.train.AdamOptimizer(learning_rate).minimize(self.
↪cost)
```

[6]:
```
tf.reset_default_graph()
modelnn = Model(learning_rate, num_layers, df.shape[1], size_layer,␣
↪dropout_rate)
sess = tf.InteractiveSession()
sess.run(tf.global_variables_initializer())
```

```
WARNING:tensorflow:<tensorflow.python.ops.rnn_cell_impl.LSTMCell object at
0x7feb0aebbfd0>: Using a concatenated state is slower and will soon be
deprecated.  Use state_is_tuple=True.
```

[7]:
```
for i in range(epoch):
    init_value = np.zeros((1, num_layers * 2 * size_layer))
    total_loss = 0
    for k in range(0, (df.shape[0] // timestamp) * timestamp, timestamp):
        batch_x = np.expand_dims(df.iloc[k: k + timestamp].values, axis = 0)
        batch_y = df.iloc[k + 1: k + timestamp + 1].values
        last_state, _, loss = sess.run([modelnn.last_state,
                                        modelnn.optimizer,
                                        modelnn.cost], feed_dict={modelnn.X:␣
↪batch_x,
                                                                  modelnn.Y:␣
↪batch_y,
                                                                  modelnn.
↪hidden_layer: init_value})
        init_value = last_state
        total_loss += loss
    total_loss /= (df.shape[0] // timestamp)
    if (i + 1) % 100 == 0:
        print('epoch:', i + 1, 'avg loss:', total_loss)
```

```
epoch: 100 avg loss: 0.032256167317772734
epoch: 200 avg loss: 0.01611048075348412
epoch: 300 avg loss: 0.010450065255883663
epoch: 400 avg loss: 0.010217295865004417
epoch: 500 avg loss: 0.009890825056635518
```

[8]:
```
output_predict = np.zeros((df.shape[0] + future_weeks, df.shape[1]))
output_predict[0, :] = df.iloc[0]
upper_b = (df.shape[0] // timestamp) * timestamp
init_value = np.zeros((1, num_layers * 2 * size_layer))
for k in range(0, (df.shape[0] // timestamp) * timestamp, timestamp):
    out_logits, last_state = sess.run([tf.nn.sigmoid(modelnn.logits), modelnn.
↪last_state],
                                      feed_dict = {modelnn.X:np.expand_dims(df.
↪iloc[k: k + timestamp], axis = 0),
                                     modelnn.hidden_layer: init_value})
    init_value = last_state
```

```
    output_predict[k + 1: k + timestamp + 1] = out_logits

out_logits, last_state = sess.run([tf.nn.sigmoid(modelnn.logits), modelnn.
 ↪last_state],
                                  feed_dict = {modelnn.X:np.expand_dims(df.
 ↪iloc[upper_b:], axis = 0),
                                     modelnn.hidden_layer: init_value})
init_value = last_state
output_predict[upper_b + 1: df.shape[0] + 1] = out_logits
df.loc[df.shape[0]] = out_logits[-1]
date_ori.append(date_ori[-1]+timedelta(days=3))
```

[9]:
```
for i in range(future_weeks - 1):
    out_logits, last_state = sess.run([tf.nn.sigmoid(modelnn.logits), modelnn.
 ↪last_state], feed_dict =
                                      {modelnn.X:np.expand_dims(df.
 ↪iloc[-timestamp:], axis = 0),
                                     modelnn.hidden_layer: init_value})
    init_value = last_state
    output_predict[df.shape[0], :] = out_logits[-1, :]
    df.loc[df.shape[0]] = out_logits[-1, :]
    date_ori.append(date_ori[-1]+timedelta(days=3))
```

[10]:
```
date_ori=pd.Series(date_ori).dt.strftime(date_format='%Y-%m-%d').tolist()
```

[11]:
```
index = (-np.round(df.values).sum(axis=0)).argsort()[4:10]
index
```

[11]:
```
array([35, 21, 34, 10,  3, 33])
```

[12]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
```

[13]:
```
fig = plt.figure(figsize = (15,15))
for no, i in enumerate(index):
    plt.subplot(6,1,no+1)
    label = list(df)[i]
    plt.plot(np.around(df.iloc[:,i]),label='predicted ' + label,alpha=0.7)
    plt.plot(np.around(df_copy.iloc[:,i]),label='real ' + label,alpha=0.7)
    plt.legend()
    x_range_future = np.arange(df.shape[0])
    plt.xticks(x_range_future[::20], date_ori[::20])
plt.show()
plt.show()
```

[33]:
```python
def df_shift(df,lag=0,rejected_columns = []):
    df = df.copy()
    if not lag:
        return df
    cols ={}
    for i in range(1,lag+1):
        for x in list(df.columns):
            if x not in rejected_columns:
                if not x in cols:
                    cols[x] = ['{}_{}'.format(x, i)]
                else:
                    cols[x].append('{}_{}'.format(x, i))
    for k,v in cols.items():
        columns = v
```

```
        dfn = pd.DataFrame(data=None, columns=columns, index=df.index)
        i = 1
        for c in columns:
            dfn[c] = df[k].shift(periods=i)
            i+=1
        df = pd.concat([df, dfn], axis=1, join_axes=[df.index])
    return df
```

[34]:
```
df_new = df_shift(df, 2)
df_new.shape
```

[34]: (179, 135)

[35]:
```
df_new.head()
```

[35]:

	Cami Dresses	Shirts	Tote Bags	Sneakers	Crop Tops	Polos	\
0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	

	Cross Body Bags	Casual Jackets	Swimwear Bottoms	Scarves	\
0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	

	…	Scarves_1	Scarves_2	Beauty Eyes_1	\
0	…	NaN	NaN	NaN	
1	…	0.0	NaN	0.0	
2	…	0.0	0.0	0.0	
3	…	0.0	0.0	0.0	
4	…	0.0	0.0	0.0	

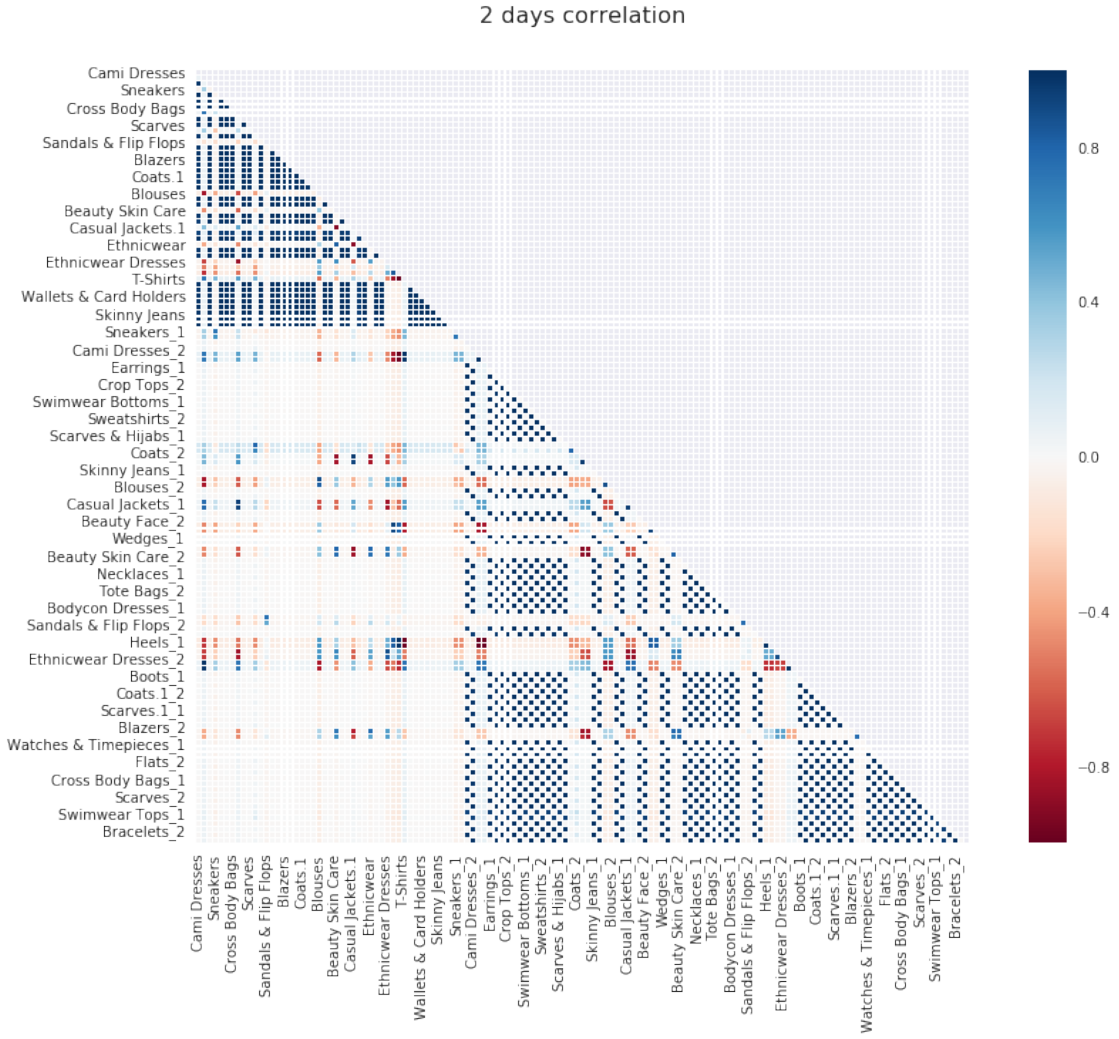
	Beauty Eyes_2	Swimwear Tops_1	Swimwear Tops_2	Bracelets_1	Bracelets_2	\
0	NaN	NaN	NaN	NaN	NaN	
1	NaN	0.0	NaN	0.0	NaN	
2	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	

	Wallets & Card Holders_1	Wallets & Card Holders_2
0	NaN	NaN
1	0.0	NaN
2	0.0	0.0

```
3                    0.0                    0.0
4                    0.0                    0.0

[5 rows x 135 columns]
```

[36]:
```
df_new = df_new.dropna()
```

[37]:
```
colormap = plt.cm.RdBu
plt.figure(figsize=(15,10))
plt.title('2 days correlation', y=1.05, size=16)

mask = np.zeros_like(df_new.corr())
mask[np.triu_indices_from(mask)] = True

sns.heatmap(df_new.corr(), mask=mask, linewidths=0.1,vmax=1.0,
            square=True, cmap=colormap, linecolor='white', annot=False)
plt.show()
```



[ ]: