Sec 1 Lecture 2-Logistic Regression

January 18, 2024

1 1.) Pull in Data and Convert ot Monthly

[1]:
```
import yfinance as yf
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
apple_data = yf.download('AAPL')
df = apple_data.resample("M").last()[["Adj Close"]]
```

```
[*********************100%%**********************]  1 of 1 completed
```

2 2.) Create columns.

- Current Stock Price, Difference in stock price, Whether it went up or down over the next month, option premium

[3]:
```
df

# Difference in stock price
df['Diff'] = df['Adj Close'].diff().shift(-1)

#Target up or down
df['Target'] = np.sign(df['Diff'])

#Option Premium
df['Premium'] = 0.08 * df['Adj Close']
```

[4]:
```
df.head()
```

[4]:
```
            Adj Close      Diff  Target   Premium
Date
1980-12-31   0.117887 -0.020296    -1.0  0.009431
1981-01-31   0.097591 -0.006045    -1.0  0.007807
1981-02-28   0.091546 -0.006909    -1.0  0.007324
1981-03-31   0.084637  0.013386     1.0  0.006771
1981-04-30   0.098023  0.016409     1.0  0.007842
```

3 3.) Pull in X data, normalize and build a LogReg on column 2

[5]:

```
#data already normalized

import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn import metrics
```

[6]:

```
X = pd.read_csv("Xdata.csv", index_col="Date", parse_dates=["Date"])
X.head()
```

[6]:

```
                VAR1
Date
1980-12-31  0.163261
1981-01-31  0.437449
1981-02-28 -0.334994
1981-03-31  2.550820
1981-04-30  3.170655
```

[7]:

```
y = df.loc[:"2023-09-30","Target"].copy()


df = df.loc[:"2023-09-30",:].copy()
```

[8]:

```
logreg = LogisticRegression()

logreg.fit(X, y)

y_pred = logreg.predict(X)
```

4 4.) Add columns, prediction and profits.

[9]:

```
df['Predicitons'] = y_pred
```

[10]:

```
df['Profits'] = 0.
```

[11]:

```
# True Positives
df.loc[(df['Predicitons'] == 1) & (df["Target"] == 1), 'Profits'] =␣
 ↪df['Premium']


# False Positives
df.loc[(df['Predicitons'] == 1) & (df["Target"] == -1), 'Profits'] =␣
 ↪100*df['Diff'] + df['Premium']
```

```python

# True Negative

# False Positive
```

[12]:

```python
df
```

[12]:

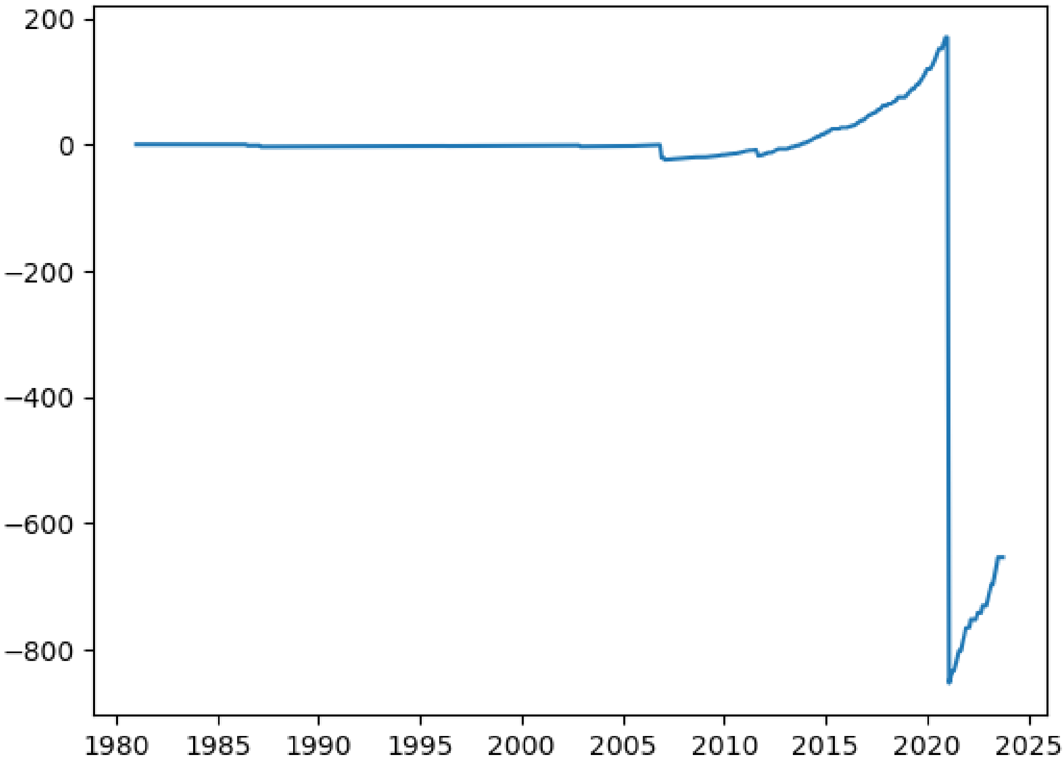
```
                Adj Close       Diff  Target    Premium  Predicitons    Profits
Date
1980-12-31       0.117887  -0.020296    -1.0   0.009431         -1.0   0.000000
1981-01-31       0.097591  -0.006045    -1.0   0.007807         -1.0   0.000000
1981-02-28       0.091546  -0.006909    -1.0   0.007324         -1.0   0.000000
1981-03-31       0.084637   0.013386     1.0   0.006771          1.0   0.006771
1981-04-30       0.098023   0.016409     1.0   0.007842          1.0   0.007842
…                       …          …       …          …            …          …
2023-05-31     176.778076  16.675476     1.0  14.142246          1.0  14.142246
2023-06-30     193.453552   2.473404     1.0  15.476284          1.0  15.476284
2023-07-31     195.926956  -8.304138    -1.0  15.674156         -1.0   0.000000
2023-08-31     187.622818 -16.638077    -1.0  15.009825         -1.0   0.000000
2023-09-30     170.984741  -0.439423    -1.0  13.678779         -1.0   0.000000

[514 rows x 6 columns]
```

5 5.) Plot profits over time

[13]:

```python
plt.plot(np.cumsum(df['Profits']))
plt.show()
```



5.0.1 Add Q5.5.) Short write up about how you see your skills valuable to PJ and/or Philip Liu

My proficiency in machine learning and data science is a valuable asset for Philip Liu in the cryptocurrency market. I can analyze extensive datasets, uncover market trends, and develop predictive models to enhance decision-making. By leveraging these skills, I aim to provide Philip with data-driven insights, improved risk assessment, and optimized trading strategies, ultimately contributing to his success in navigating the dynamic and competitive cryptocurrency landscape.

6 6.) Create a loop that stores total profits over time

[14]:
```
# will do next class
```

7 7.) What is the optimal threshold and plot the total profits for this model.

[ ]:
```
# will do next class
```