Social Media Analytics - Twitter

Signing up for using Twitter APIs

Using Twitter API to access twitter data.

We are creating a twitter app using https://apps.twitter.com . Once we create an app we make a file named auth.k which contains keys/tokens in the order Consumer_key, Consumer_secret, Access_token, Access_token_secret. These are copied from the twitter app which we created.

Get the Twitter search Python script

We write script in Python to use the authentication keys to get data from twitter. The file tw_search.py takes the auth.k as input which calls the twitter and get us the data.

We run tw_search.py python script using the configuration python ./twitter_search.py brexit -c 180 where the third word (brexit)is the search term we want to run on Twitter. This searches brexit tweets and retrieve 180 tweets. The script writes the data in result.csv file having 6 columns – created time, retweet count, hashtag, followers count, friends count. We take different topics/politicians and re-run the python script to collect 180 tweets for each topics/politicians.

Regression Analysis

We use the dataset to see if there are any relationships among number of followers, number of friends, and number of retweets. We create a new python script (Twitter_FriendsFollowers.py) for analysing the relationships. We find correlations among variables in the dataset. We create regression model, plot and line for varaibles having medium to high level positive/negative correlation. We check the R-square value and the p-value. Based on the regression plot and model, we state the hypothesis such as more followers, more number of retweets.

Sentiment Analysis on Twitter data

People express all kinds of opinions and sentiments on Twitter, so we analyse those sentiments. We write a script in python twitter_sentiments.py script to perform Sentiment Analysis for a topic/politician.

We use a package called TexBlob, which has a number of very useful functions for processing textual data.To use those functions, we need to convert a string (text) to an object of TextBlob type.

First, we collect some data as we did before. Next, we use the TextBlob package to go through the dataframe one row at a time and find the text – in this case a tweet stored in a variable/column named ‘text’. Once we have that tweet, convert it into a TextBlob object, and then we can ask it to analyze that string for subjectivity and polarity.

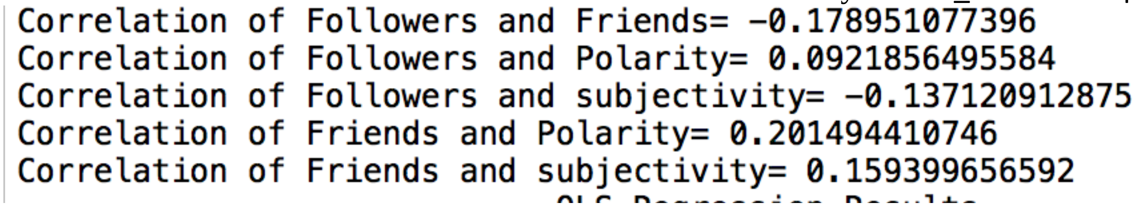
This script calculates the polarity and the subjectivity and adds in the data. The resulted file from this contains 10 columns: username, author id, created, text, retwc, hashtag, followers, friends, polarity, subjectivity. We change the query to different topics/politicians and re-run the python script to collect tweets and calculate polarity and subjectivity(sentiments) for each topics/politicians (Gun control).

We create a new python script(TwitterGun.py) for analysing the above resulted file. We again find the correlation between variables in the resulted file. We create regression model, plot and line for varaibles having medium to high level positive/negative correlation. We check the R-square value and the p-value. Based on the regression plot and model, we state the hypothesis such as More the followers, more the tweets sentiment is becoming objective, as the subjectivity is getting close to zero.

I have selected Steve Smith, Kim Jong, and Trump. So 180 tweets are collected for each personalities using tw_search.py and around 50 tweets using twitter_sentiments.py.

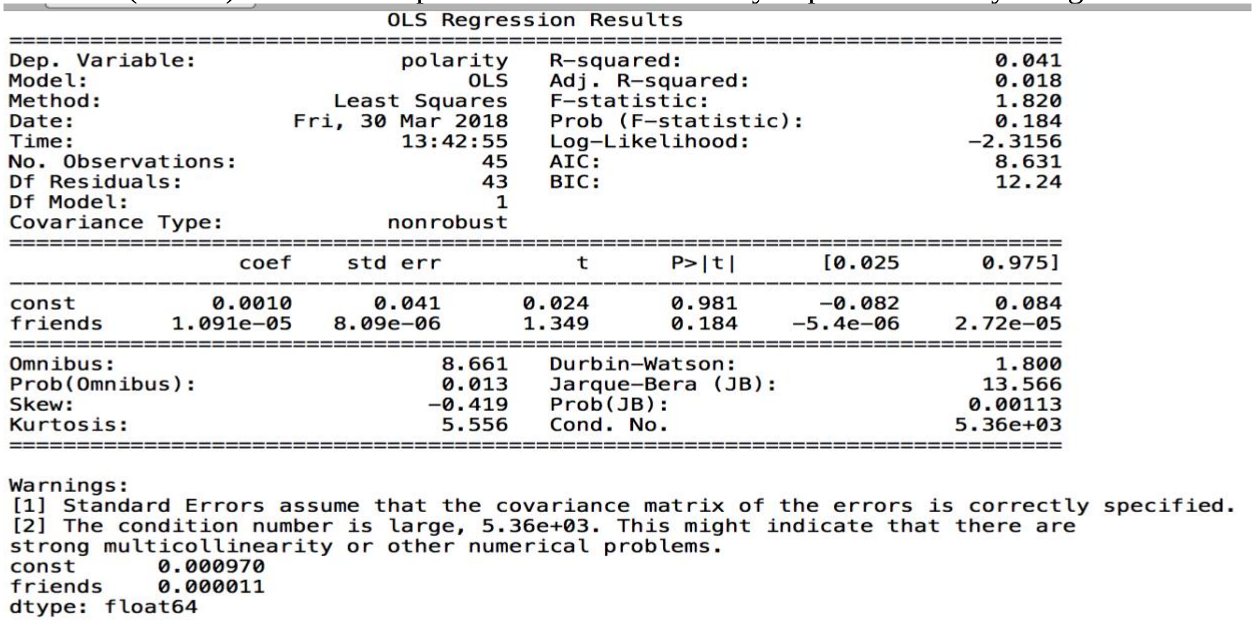
For Steve Smith :

We find the correlation between variables in the dataset created by twitter_sentiments.py



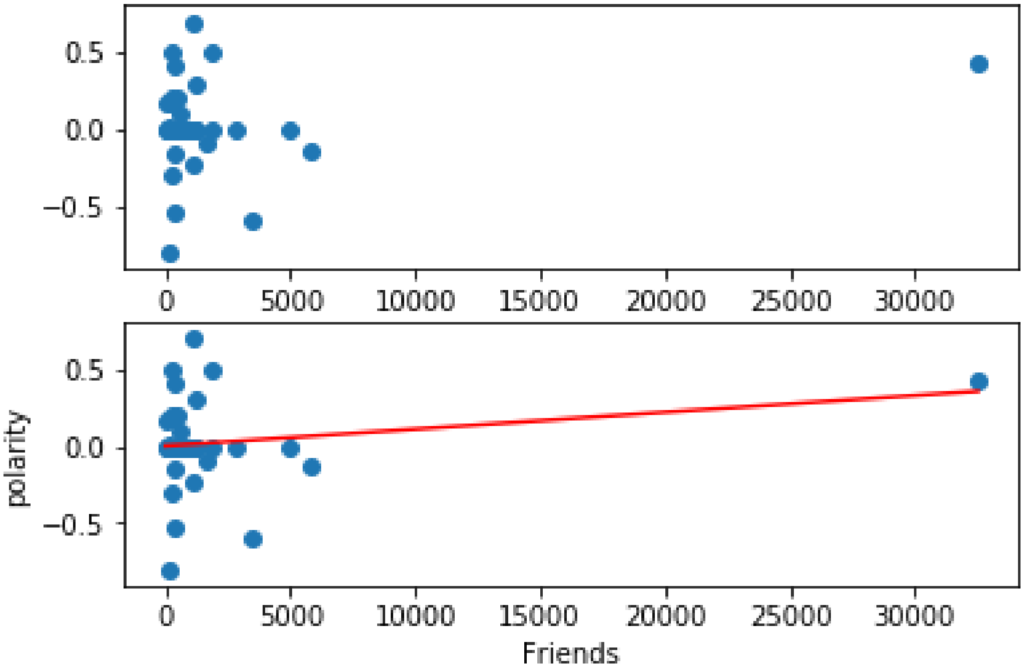
```
Correlation of Followers and Friends= -0.178951077396
Correlation of Followers and Polarity= 0.0921856495584
Correlation of Followers and subjectivity= -0.137120912875
Correlation of Friends and Polarity= 0.201494410746
Correlation of Friends and subjectivity= 0.159399656592
```

So we first take the variables Friends and Polarity as it has the highest correlation among the variables (0.2014) which is low positive correlation. We try to predict Polarity using Friends.



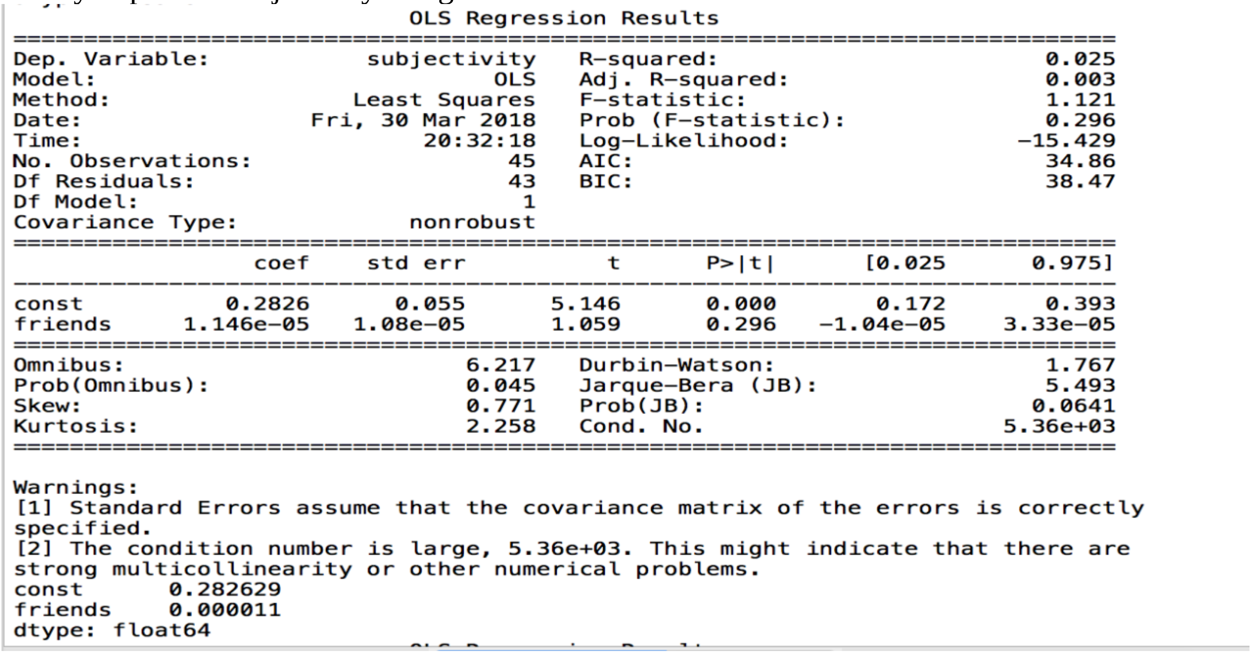
```
                            OLS Regression Results
==============================================================================
Dep. Variable:               polarity   R-squared:                       0.041
Model:                            OLS   Adj. R-squared:                  0.018
Method:                 Least Squares   F-statistic:                     1.820
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.184
Time:                        13:42:55   Log-Likelihood:                -2.3156
No. Observations:                  45   AIC:                             8.631
Df Residuals:                      43   BIC:                             12.24
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.0010      0.041      0.024      0.981      -0.082       0.084
friends     1.091e-05   8.09e-06      1.349      0.184    -5.4e-06    2.72e-05
==============================================================================
Omnibus:                        8.661   Durbin-Watson:                   1.800
Prob(Omnibus):                  0.013   Jarque-Bera (JB):               13.566
Skew:                          -0.419   Prob(JB):                      0.00113
Kurtosis:                       5.556   Cond. No.                     5.36e+03
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 5.36e+03. This might indicate that there are
strong multicollinearity or other numerical problems.
const      0.000970
friends    0.000011
dtype: float64
```

We get a R-square value of 0.041 for friends and polarity. The equation of the regression line is
Polarity = 0.000011*Friends + 0.000970
Regression plot :



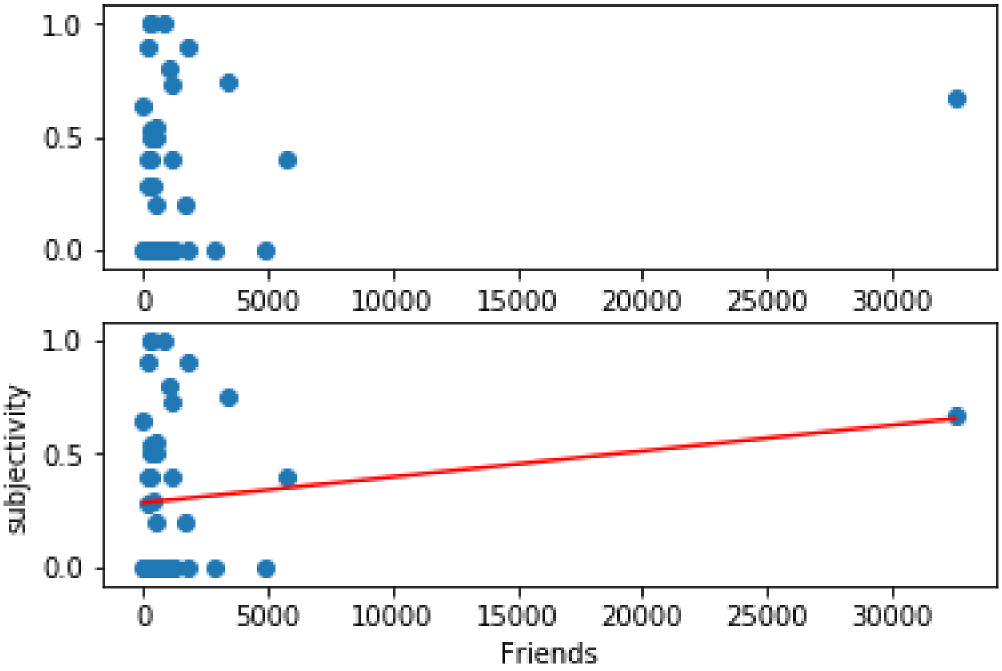
Hypothesis :
Based on the regression plot and model, We can say that More the friends, more the polarity is becoming from neutral (0) to positive.(0.5), so the tweets sentiments is becoming positive.

We then take the variables Friends and subjectivity which has (0.1593) low positive correlation. We try to predict subjectivity using Friends.



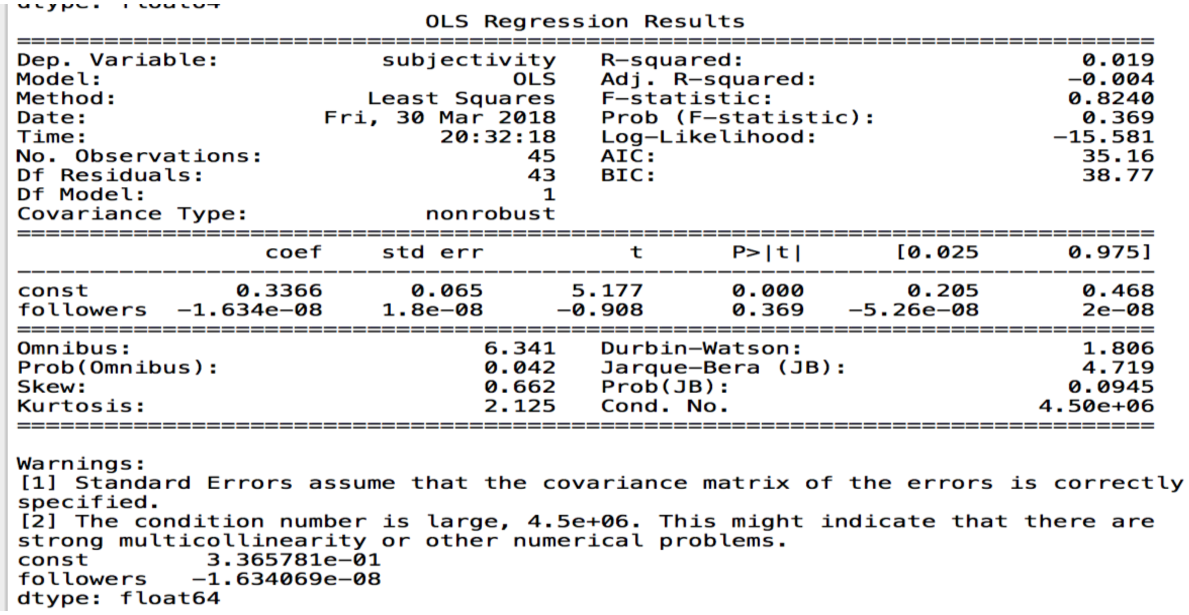
```
                            OLS Regression Results
==============================================================================
Dep. Variable:           subjectivity   R-squared:                       0.025
Model:                            OLS   Adj. R-squared:                  0.003
Method:                 Least Squares   F-statistic:                     1.121
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.296
Time:                        20:32:18   Log-Likelihood:                -15.429
No. Observations:                  45   AIC:                             34.86
Df Residuals:                      43   BIC:                             38.47
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.2826      0.055      5.146      0.000       0.172       0.393
friends     1.146e-05   1.08e-05      1.059      0.296   -1.04e-05    3.33e-05
==============================================================================
Omnibus:                        6.217   Durbin-Watson:                   1.767
Prob(Omnibus):                  0.045   Jarque-Bera (JB):                5.493
Skew:                           0.771   Prob(JB):                       0.0641
Kurtosis:                       2.258   Cond. No.                     5.36e+03
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 5.36e+03. This might indicate that there are
strong multicollinearity or other numerical problems.
const      0.282629
friends    0.000011
dtype: float64
```

We get a R-square value of 0.025 for friends and subjectivity. The equation of the regression line is Subjectivity = 0.000011*Friends + 0.282629
Regression plot :



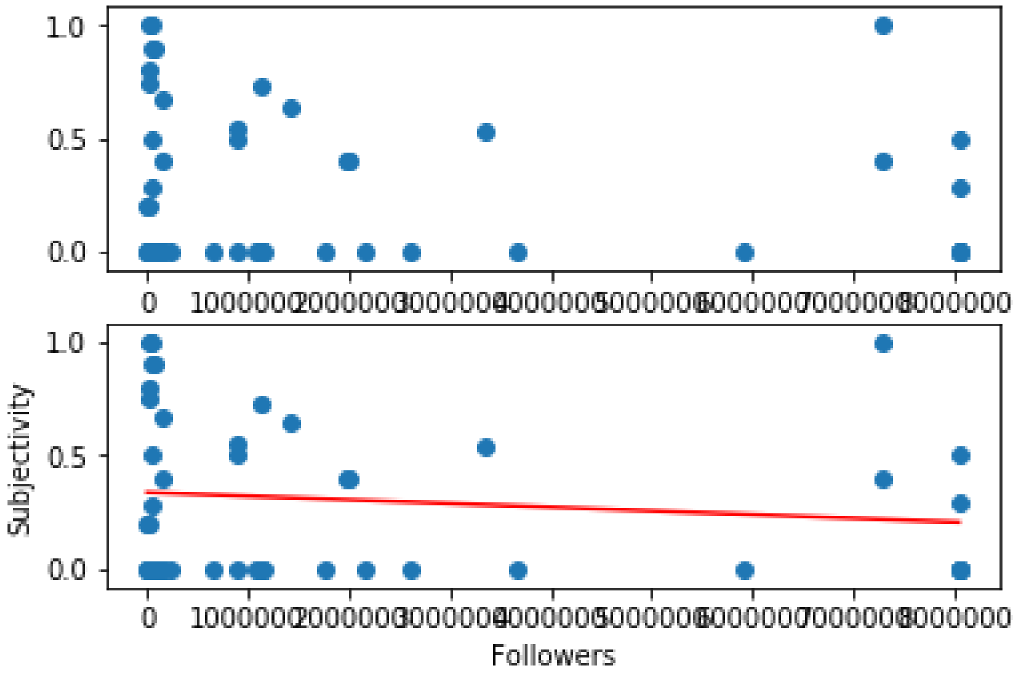
Hypothesis :
Based on the regression plot and model, We can say that More the friends, more the tweets sentiment is becoming subjective, as the subjectivity is becoming close to 1.

We then take the variables Followers and subjectivity which has (-0.1371) low negative correlation. We try to predict subjectivity using Followers.



```
dtype: float64
                            OLS Regression Results
==============================================================================
Dep. Variable:           subjectivity   R-squared:                       0.019
Model:                            OLS   Adj. R-squared:                 -0.004
Method:                 Least Squares   F-statistic:                    0.8240
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.369
Time:                        20:32:18   Log-Likelihood:                -15.581
No. Observations:                  45   AIC:                             35.16
Df Residuals:                      43   BIC:                             38.77
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.3366      0.065      5.177      0.000       0.205       0.468
followers  -1.634e-08    1.8e-08     -0.908      0.369   -5.26e-08       2e-08
==============================================================================
Omnibus:                        6.341   Durbin-Watson:                   1.806
Prob(Omnibus):                  0.042   Jarque-Bera (JB):                4.719
Skew:                           0.662   Prob(JB):                       0.0945
Kurtosis:                       2.125   Cond. No.                     4.50e+06
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 4.5e+06. This might indicate that there are
strong multicollinearity or other numerical problems.
const        3.365781e-01
followers   -1.634069e-08
dtype: float64
```

We get a R-square value of 0.025 for friends and subjectivity. The equation of the regression line is Subjectivity = -1.634069e-08*Followers + 3.365781e-01
Regression plot :

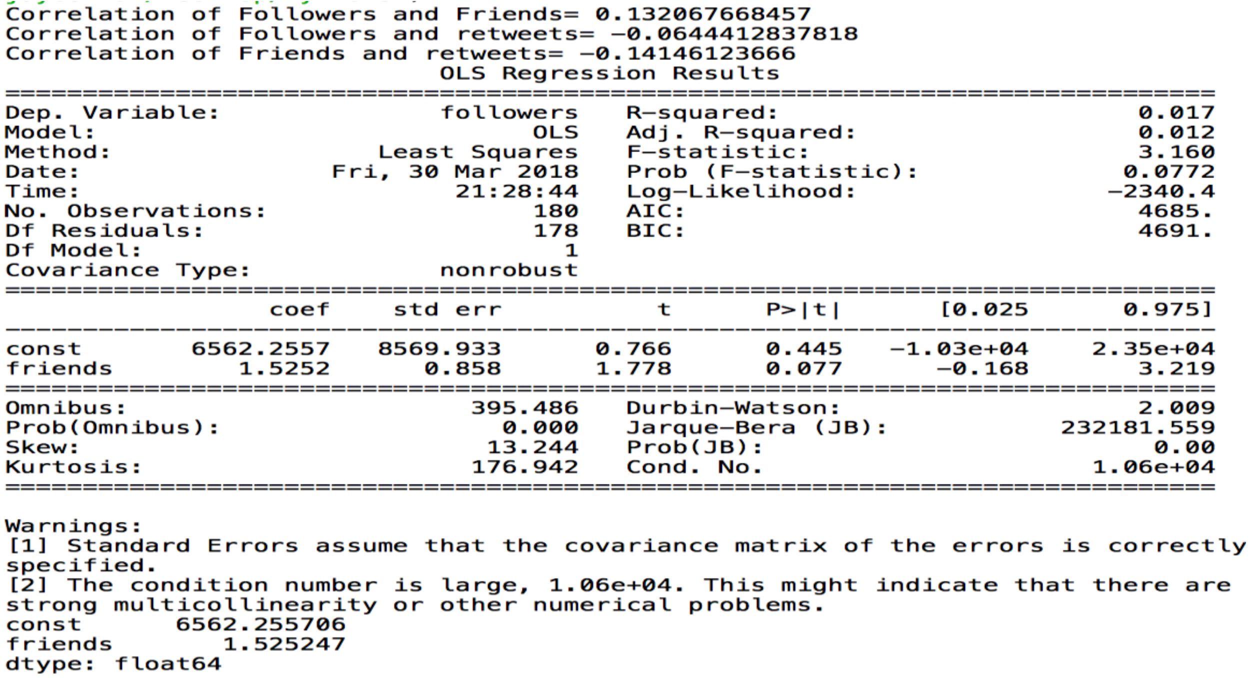


Hypothesis :

Based on the regression plot and model, We can say that More the followers, more the tweets sentiment is becoming objective, as the subjectivity is getting close to zero.

For Kim Jong :

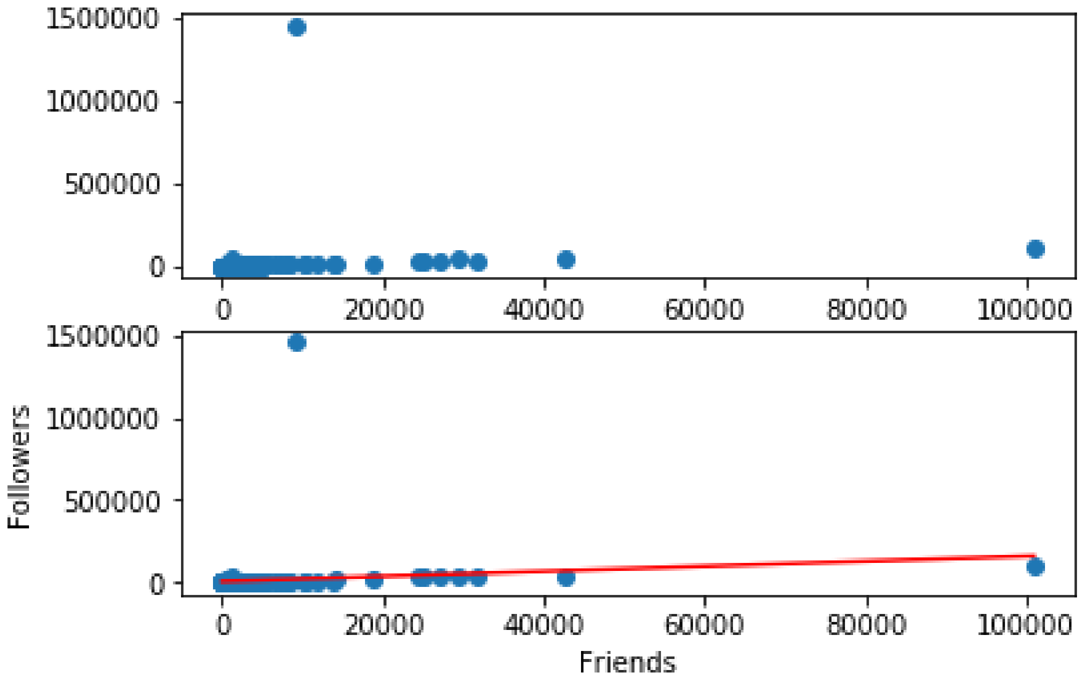
We find the correlation between variables in the dataset using tw_search.py



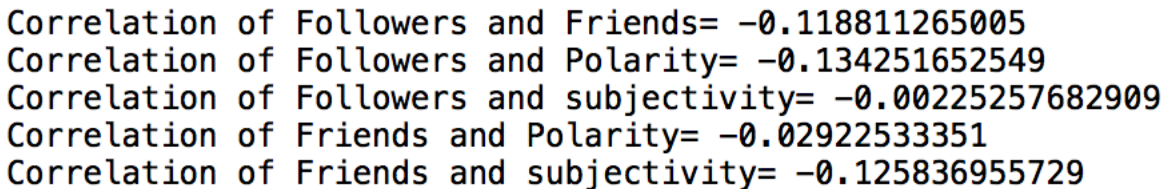
```
Correlation of Followers and Friends= 0.132067668457
Correlation of Followers and retweets= -0.0644412837818
Correlation of Friends and retweets= -0.14146123666
                            OLS Regression Results
==============================================================================
Dep. Variable:              followers   R-squared:                       0.017
Model:                            OLS   Adj. R-squared:                  0.012
Method:                 Least Squares   F-statistic:                     3.160
Date:                Fri, 30 Mar 2018   Prob (F-statistic):             0.0772
Time:                        21:28:44   Log-Likelihood:                -2340.4
No. Observations:                 180   AIC:                             4685.
Df Residuals:                     178   BIC:                             4691.
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const       6562.2557   8569.933      0.766      0.445   -1.03e+04    2.35e+04
friends        1.5252      0.858      1.778      0.077      -0.168       3.219
==============================================================================
Omnibus:                      395.486   Durbin-Watson:                   2.009
Prob(Omnibus):                  0.000   Jarque-Bera (JB):           232181.559
Skew:                          13.244   Prob(JB):                         0.00
Kurtosis:                     176.942   Cond. No.                     1.06e+04
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 1.06e+04. This might indicate that there are
strong multicollinearity or other numerical problems.
const      6562.255706
friends       1.525247
dtype: float64
```

We then take the variables Followers and friends which has (0.32067) low negative correlation.. We try to predict Followers using Friends.

We get a R-square value of 0.017 for friends and followers. The equation of the regression line is Followers = 1.5252*Friends + 6562.255706
Regression plot :



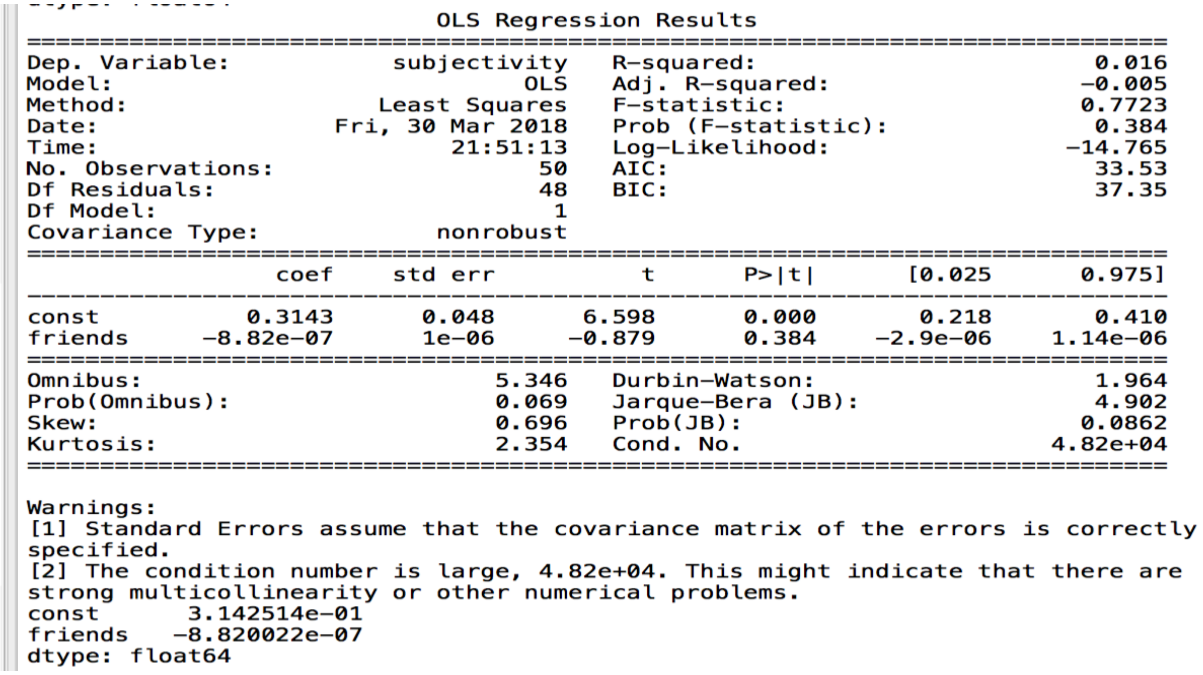
We find the correlation between variables in the dataset using twitter-sentiments.py



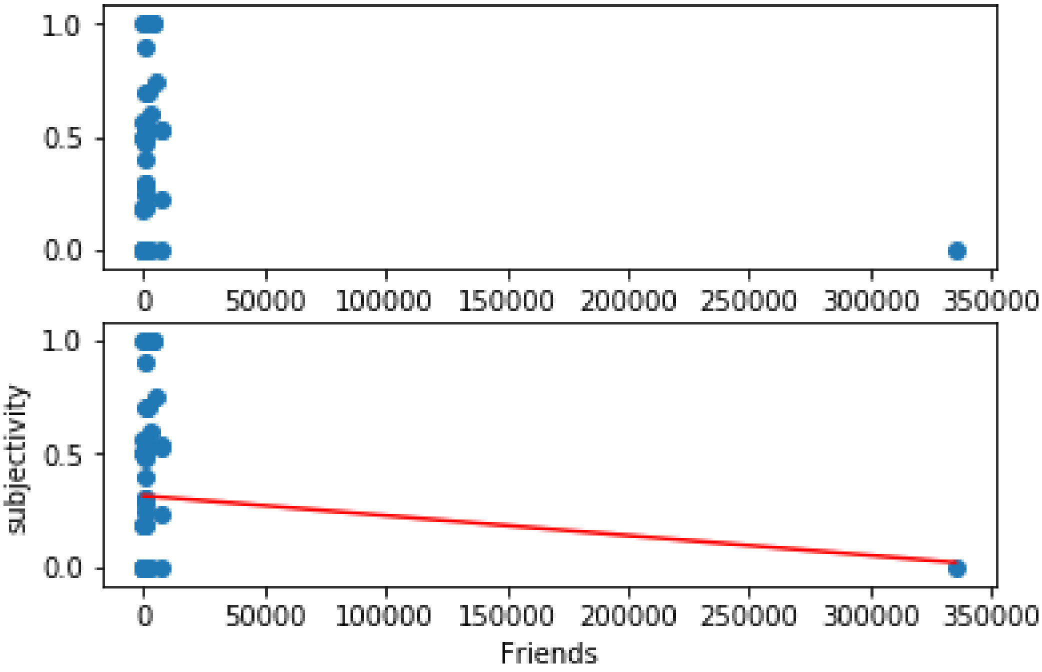
```
Correlation of Followers and Friends= -0.118811265005
Correlation of Followers and Polarity= -0.134251652549
Correlation of Followers and subjectivity= -0.00225257682909
Correlation of Friends and Polarity= -0.02922533351
Correlation of Friends and subjectivity= -0.125836955729
```

We then take Friends and subjectivity variables which has (-0.1258) low negative correlation and we try to predict subjectivity using Friends.

We get a R-square value of 0.016 for friends and subjectivity. The equation of the regression line is Subjectivity = -8.820022e-07*Friends + 3.142514e-01



```
                            OLS Regression Results                            
==============================================================================
Dep. Variable:           subjectivity   R-squared:                       0.016
Model:                            OLS   Adj. R-squared:                 -0.005
Method:                 Least Squares   F-statistic:                    0.7723
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.384
Time:                        21:51:13   Log-Likelihood:                -14.765
No. Observations:                  50   AIC:                             33.53
Df Residuals:                      48   BIC:                             37.35
Df Model:                           1                                         
Covariance Type:            nonrobust                                         
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.3143      0.048      6.598      0.000       0.218       0.410
friends     -8.82e-07      1e-06     -0.879      0.384    -2.9e-06    1.14e-06
==============================================================================
Omnibus:                        5.346   Durbin-Watson:                   1.964
Prob(Omnibus):                  0.069   Jarque-Bera (JB):                4.902
Skew:                           0.696   Prob(JB):                       0.0862
Kurtosis:                       2.354   Cond. No.                     4.82e+04
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 4.82e+04. This might indicate that there are
strong multicollinearity or other numerical problems.
const      3.142514e-01
friends   -8.820022e-07
dtype: float64
```

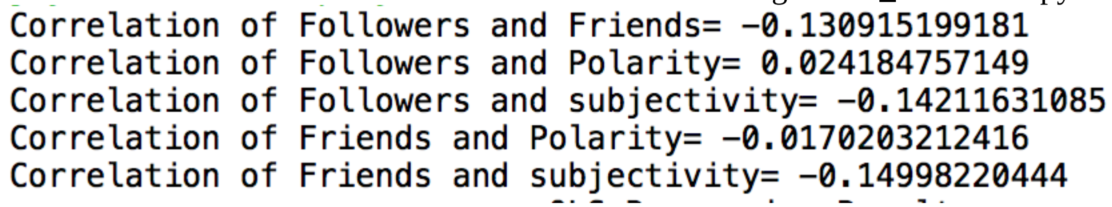


Hypothesis :

Based on the regression plot and model, We can say that More the Friends, more the tweets sentiment is becoming objective, as the subjectivity is getting close to zero.

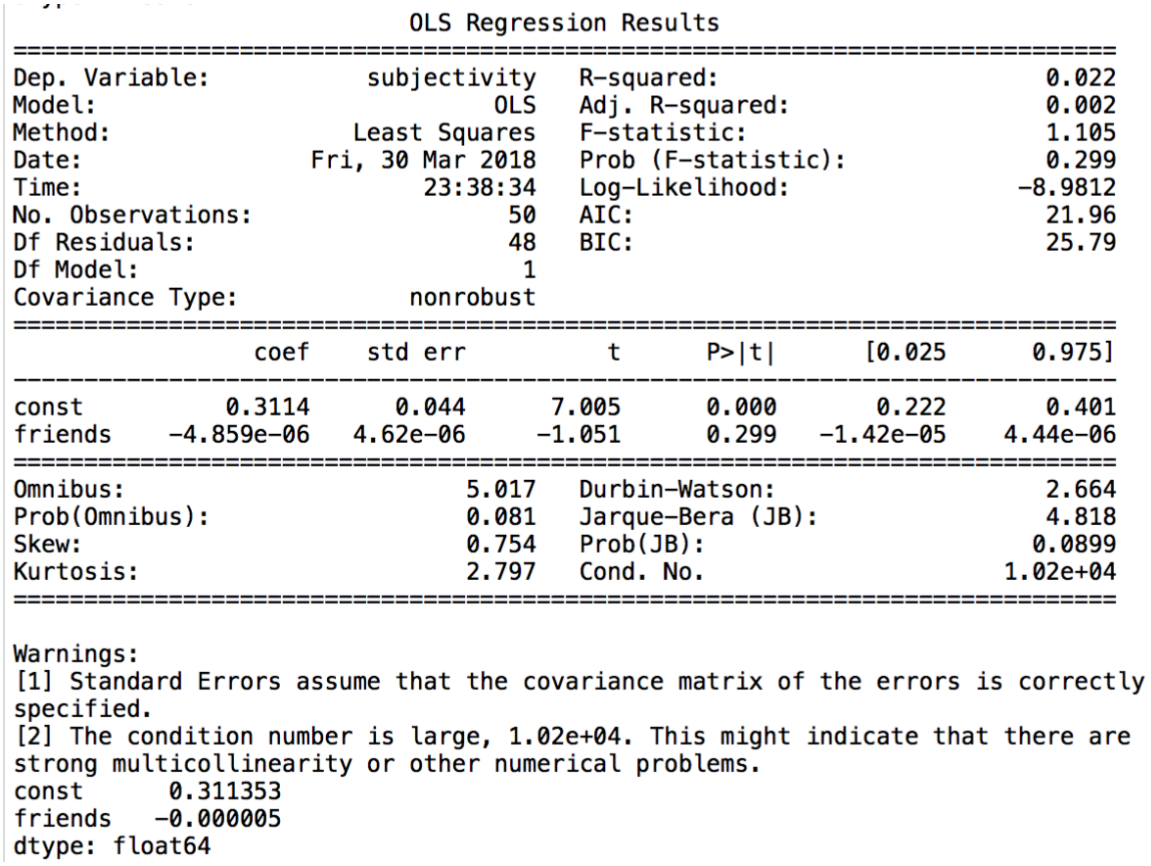
For Trump:

We find the correlation between variables in the dataset using twitter_sentiments.py



```
Correlation of Followers and Friends= -0.130915199181
Correlation of Followers and Polarity= 0.024184757149
Correlation of Followers and subjectivity= -0.14211631085
Correlation of Friends and Polarity= -0.0170203212416
Correlation of Friends and subjectivity= -0.14998220444
```

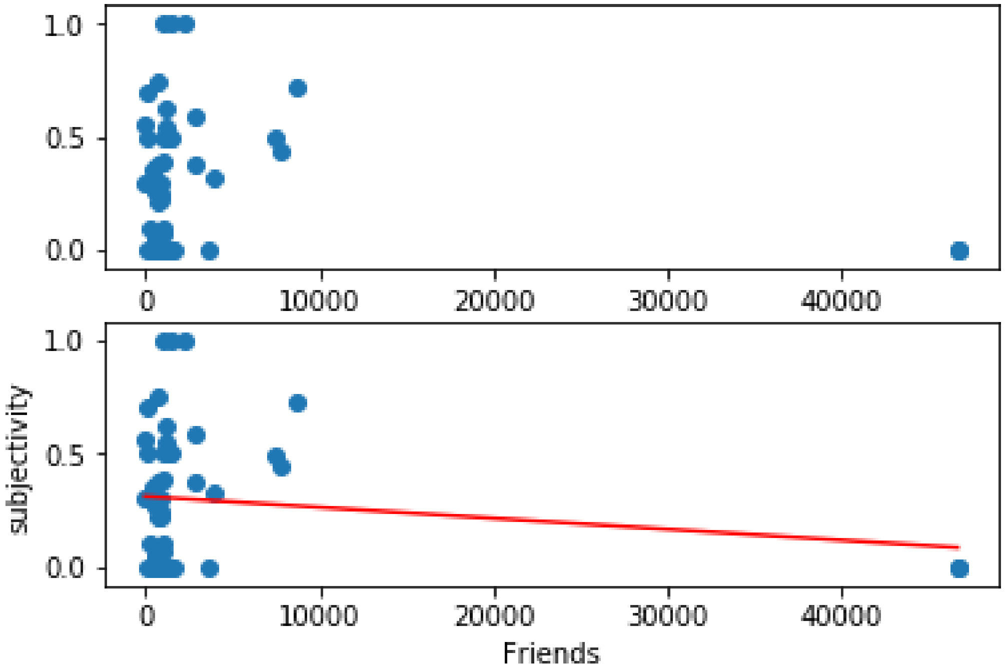
So we first take the variables Friends and subjectivity as it has the highest correlation among the variables (-0.1499) which is low negative correlation. We try to predict subjectivity using Friends.



```
                            OLS Regression Results
==============================================================================
Dep. Variable:           subjectivity   R-squared:                       0.022
Model:                            OLS   Adj. R-squared:                  0.002
Method:                 Least Squares   F-statistic:                     1.105
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.299
Time:                        23:38:34   Log-Likelihood:                -8.9812
No. Observations:                  50   AIC:                             21.96
Df Residuals:                      48   BIC:                             25.79
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.3114      0.044      7.005      0.000       0.222       0.401
friends    -4.859e-06   4.62e-06     -1.051      0.299   -1.42e-05    4.44e-06
==============================================================================
Omnibus:                        5.017   Durbin-Watson:                   2.664
Prob(Omnibus):                  0.081   Jarque-Bera (JB):                4.818
Skew:                           0.754   Prob(JB):                       0.0899
Kurtosis:                       2.797   Cond. No.                     1.02e+04
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 1.02e+04. This might indicate that there are
strong multicollinearity or other numerical problems.
const      0.311353
friends   -0.000005
dtype: float64
```

We get a R-square value of 0.022 for friends and subjectivity. The equation of the regression line is Subjectivity = -0.000005*Friends + 0.311353

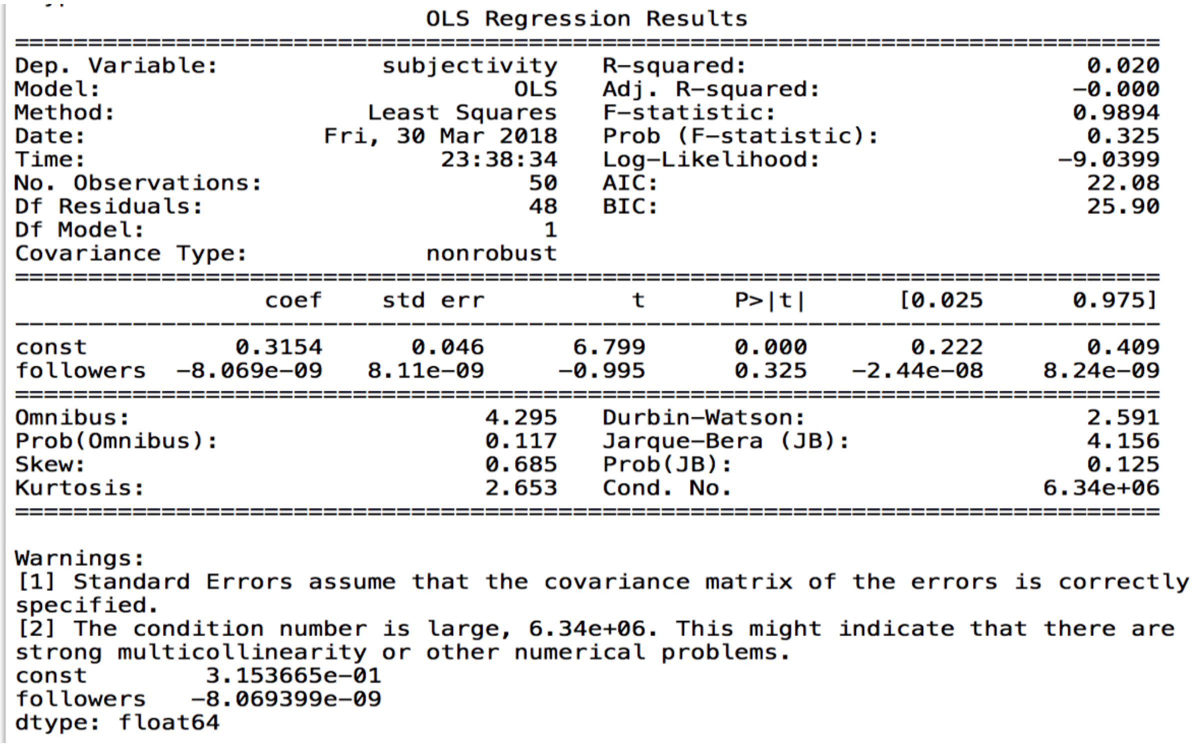
Regression plot:



Hypothesis :

Based on the regression plot and model, We can say that More the Friends, more the tweets sentiment is becoming objective, as the subjectivity is getting close to zero.

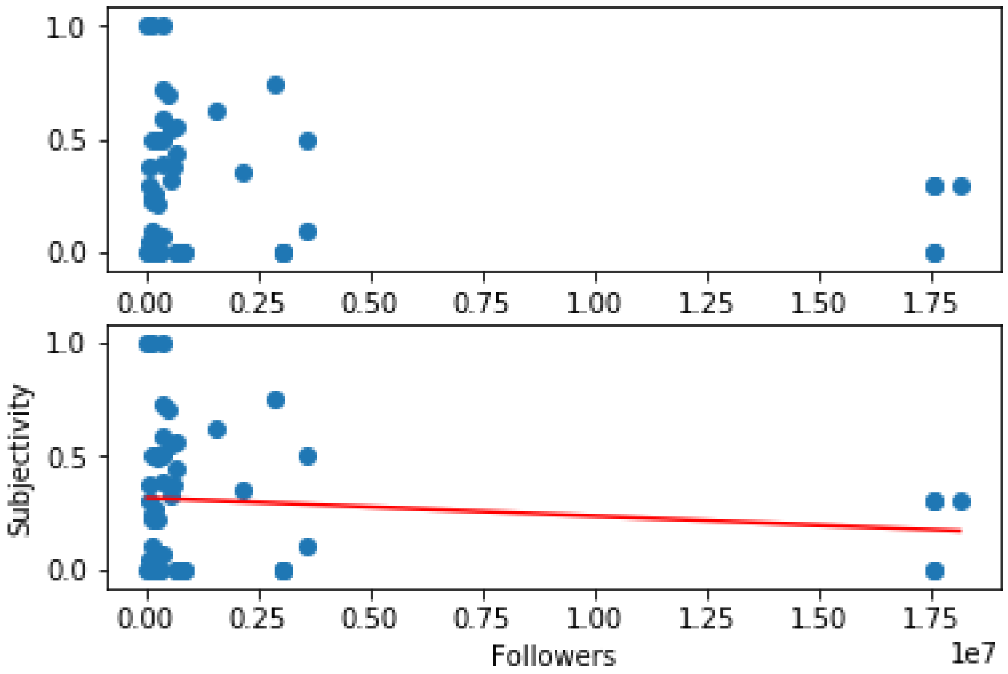
We take the variables Followers and subjectivity as it has the second highest correlation among the variables (-0.1421) which is low negative correlation. We try to predict subjectivity using Followers.



```
                            OLS Regression Results
==============================================================================
Dep. Variable:           subjectivity   R-squared:                       0.020
Model:                            OLS   Adj. R-squared:                 -0.000
Method:                 Least Squares   F-statistic:                    0.9894
Date:                Fri, 30 Mar 2018   Prob (F-statistic):              0.325
Time:                        23:38:34   Log-Likelihood:                -9.0399
No. Observations:                  50   AIC:                             22.08
Df Residuals:                      48   BIC:                             25.90
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          0.3154      0.046      6.799      0.000       0.222       0.409
followers  -8.069e-09   8.11e-09     -0.995      0.325   -2.44e-08    8.24e-09
==============================================================================
Omnibus:                        4.295   Durbin-Watson:                   2.591
Prob(Omnibus):                  0.117   Jarque-Bera (JB):                4.156
Skew:                           0.685   Prob(JB):                        0.125
Kurtosis:                       2.653   Cond. No.                     6.34e+06
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 6.34e+06. This might indicate that there are
strong multicollinearity or other numerical problems.
const        3.153665e-01
followers   -8.069399e-09
dtype: float64
```

We get a R-square value of 0.020 for followers and subjectivity. The equation of the regression line is Subjectivity = -8.069399e-09*Followers+ 3.153665e-01

Regression plot:



Hypothesis :

Based on the regression plot and model, We can say that More the Followers, more the tweets sentiment is becoming objective, as the subjectivity is getting close to zero.