Augmento_Intern

April 2, 2017

```
In [1]: import numpy as np
        import pandas as pd
        from pandas import DataFrame
        from pandas import Series
        import os
        import scipy
        import sklearn
        import seaborn as sns
        import matplotlib
        import matplotlib.pyplot as plt
        %matplotlib inline
        #plt.rcParams['figure.figsize'] = (8,8)

        import nltk
        #nltk.download("all")
        from wordcloud import WordCloud


        from IPython.core.interactiveshell import InteractiveShell
        InteractiveShell.ast_node_interactivity = "all"
```

```
In [2]: #Set PANDAS to show all columns in DataFrame
        pd.set_option('display.max_columns', None)
```

0.1 Let's Have a General Overview of Our Dataset

```
In [3]: df = pd.read_pickle("FinTech_cleaned.pkl")
```

```
In [4]: df.columns # name of the columns
        df.dtypes  # type of each column
```

```
Out[4]: Index(['topic', 'tweet', 'user', 'date', 'description', 'location',
               'followers', 'stakeholder'],
              dtype='object')
```

```
Out[4]: topic           object
        tweet           object
        user            object
```

```
date           object
description    object
location       object
followers      object
stakeholder    object
dtype: object
```

```
In [ ]:
```

```
In [5]: df.shape
        df.head(2)
        df.describe()
        #stakeholder : group the user was automatically classified to ( Ambiguous  means there i
```

```
Out[5]: (349153, 8)
```

```
Out[5]:      topic                                             tweet            user  \
        0  Fintech  #bitcoin #fintech Fedcoin: The U.S. Will Issue...  Satoshinet_com
        1  Fintech  RT @guzmand: No one innovation is a silver bul...    anas_sulaimi

                                     date  \
        0  Thu Jan 12 17:14:10 +0000 2017
        1  Thu Jan 12 17:14:12 +0000 2017

                                                 description      location followers  \
        0  #bitcoin #fintech Get Free BitCoin - BitCoin F...   Orlando, FL        \N
        1  GUtech Graduate #IT Consultant: #cybersecurity...  Muscat, Oman        \N

          stakeholder
        0   Ambiguous
        1   Ambiguous
```

```
Out[5]:          topic                                              tweet  \
        count    349153                                             349153
        unique        1                                             217112
        top     Fintech  RT @quovo: From 18 to 215 financial institutio...
        freq     349153                                               1784

                        user                             date  \
        count         349153                           349153
        unique         59345                           318660
        top     bitcoinagile  Thu Mar 02 12:42:33 +0000 2017
        freq           10018                               34

                                                  description location followers  \
        count                                          349153   349153    349153
        unique                                          62036    19335     21656
        top     Streaming News: Bitcoin, Blockchain & Beyond #...       \N        \N
        freq                                            10018    73058    173264
```

```
              stakeholder
count              349153
unique                 11
top             Ambiguous
freq               206094
```

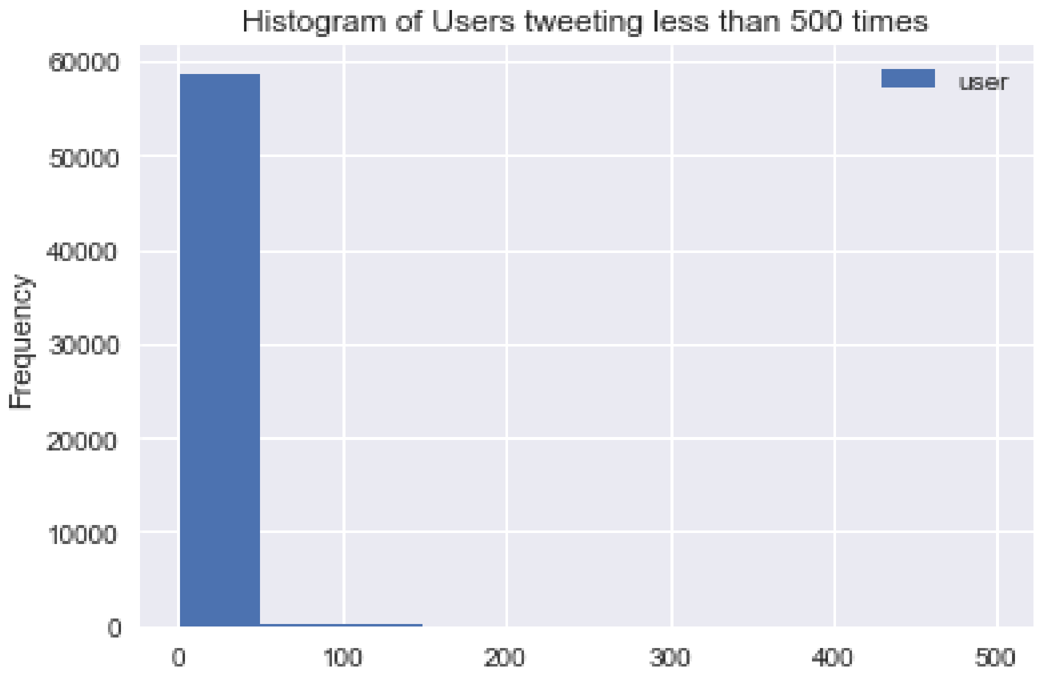
```
In [6]: print("Total no of Users:\n",len(df.user))
        print("Number of Unique Users:\n",len(pd.unique(df.user)))
        print("Total no of StackHolder:\n", len(df.stakeholder))
        print("Number of Unique Stack Holder:\n", len(pd.unique(df.stakeholder)))
```

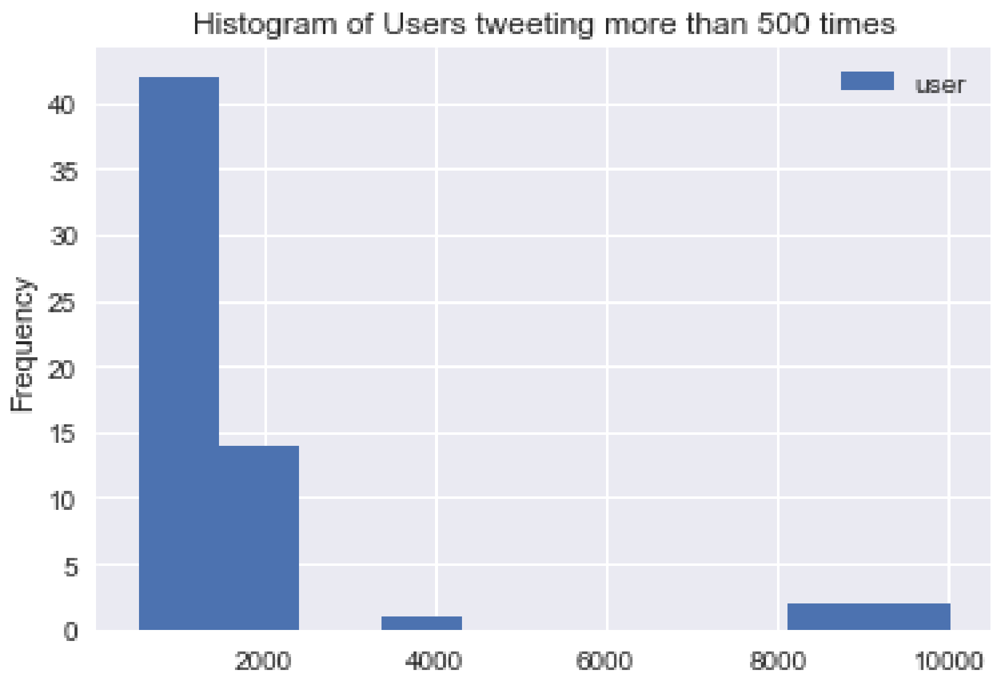
```
Total no of Users:
 349153
Number of Unique Users:
 59345
Total no of StackHolder:
 349153
Number of Unique Stack Holder:
 11
```

** 59345 Users are classifierd into 11 Different Stakeholder group(including Ambiguous) **

```
In [ ]:
```

```
In [7]: user_count = pd.DataFrame(df.user.value_counts())
        user_count.head(2)
        user_count[user_count<500].plot(kind = 'hist', title = "Histogram of Users tweeting less
        user_count[user_count>500].plot(kind = 'hist', title = "Histogram of Users tweeting more
```





** There are few users who are tweeting more than 10000 times but the maximum users are tweeting around 50 times **

```
In [8]: df['date'] = pd.to_datetime(df['date'])
        df['year'] = df.date.dt.year
        df['month'] = df.date.dt.month
        df.head(1)

Out[8]:      topic                                             tweet            user  \
        0  Fintech  #bitcoin #fintech Fedcoin: The U.S. Will Issue...  Satoshinet_com

                         date                                       description  \
        0 2017-01-12 17:14:10  #bitcoin #fintech Get Free BitCoin - BitCoin F...

              location followers stakeholder  year  month
        0  Orlando, FL        \N   Ambiguous  2017      1

In [9]: np.unique(df.year)
        np.unique(df.month)

Out[9]: array([2017])

Out[9]: array([1, 2, 3])
```

*** All the tweets are from 2017 and from first three months ***

```
In [10]: location = pd.DataFrame(df.location.value_counts())
         location.head(15)
```

```
Out[10]:                           location
         \N                           73058
         London                       11991
         Matter Doesn't Matter        10018
         London, England               9893
         Ottawa, Ontario               8334
         New York, NY                  4222
         Global                        4163
         Toronto, Ontario              3691
         Visit me                      3416
         United States                 3142
         Utah, USA                     3047
         Dallas, TX                    2388
         Singapore                     2248
         Bitcoinland                   2207
         Cincinnati, Ohio              2052
```

** Maximum no of tweets are from World's Finance Centers **

0.2 Time to do some Data Cleaning

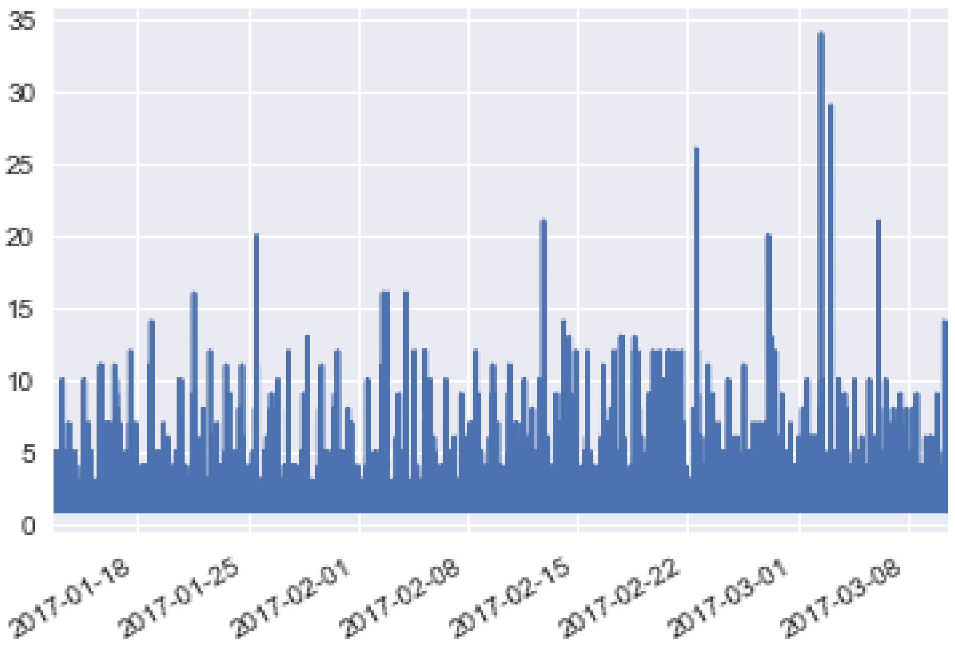
```
- I am going to omit all the rows with location /N or unknown
```

```
In [11]: df.followers.value_counts().head()
```

```
Out[11]: \N       173264
         704         251
         1944        230
         699         228
         37          219
         Name: followers, dtype: int64
```

```
In [12]: from nltk.tokenize import word_tokenize
```

```
In [13]: da = df.date.value_counts()
         da.head()
         da.plot();
```



** Tweeting activity for FinTech has a somewhat irregular trend but oVerall It's increasing with time. **

```
In [14]: # for row in [5, 9, 11]:
         #     raw_tweet = df['tweet'].get(row)
         #     print(raw_tweet)
         #     print(nltk.word_tokenize(raw_tweet.lower()), '\n')
```

```
In [15]: # from sklearn.feature_extraction.text import CountVectorizer
         # import nltk

         # raw_tweets = df['tweet'].tolist()
         # raw_tweets
```

```
In [16]: # #raw_tweets = train_data['tweet'].tolist()

         # vectorizer = CountVectorizer(tokenizer=nltk.word_tokenize,
         #                              stop_words='english',
         #                              max_features=3000,
         #                              ngram_range=(1,1))

         # # Train the vectorizer on our vocabulary
         # vectorizer.fit(raw_tweet)

         # # Make a rectangle
         # x_test = vectorizer.transform(raw_tweet)

         # x_test
```

0.3 Let's Analyse our Tweeter Data with Various StakeHolder Perspective

```
In [17]: def t(x):
             return pd.Series(dict(Number_of_tweets = x['tweet'].count(),
                                   Number_of_users = len(np.unique(x['user'])),
                                  Num_diff_locations = len(np.unique(x['location']))
                                 ))
```

I am trying to make a DataFrame giving these inforamtion for Each Stackholder: - Total No of Tweets - TOtal No of Users for Each Stackholder - No of Unique locations Users are from

```
In [18]: # Let's Count By stackholder
         stakeholder_count = df.groupby('stakeholder').apply(t)
         print(len(stakeholder_count))
         stakeholder_count
```

```
11
```

```
Out[18]:                            Num_diff_locations  Number_of_tweets  \
         stakeholder
         Academia                                  372              1716
         Ambiguous                               12884            206094
         Business Representatives                 2352             51831
         Companies                                1460             16582
         Corporate Interest Groups                 246              2103
         Expert Institutions                        79               327
         Individual Experts                        629              6294
         Media                                     754             39125
         Non-Corporate Interests                   201              1045
         Policymakers                              118               292
         Private Person                           4620             23744

                                    Number_of_users
         stakeholder
         Academia                               501
         Ambiguous                            38117
         Business Representatives              6113
         Companies                             3072
         Corporate Interest Groups              433
         Expert Institutions                     94
         Individual Experts                     989
         Media                                 1662
         Non-Corporate Interests                275
         Policymakers                           158
         Private Person                        8577
```

** Here Ambiguous Group is having a number of Various group, that's why Highest. **

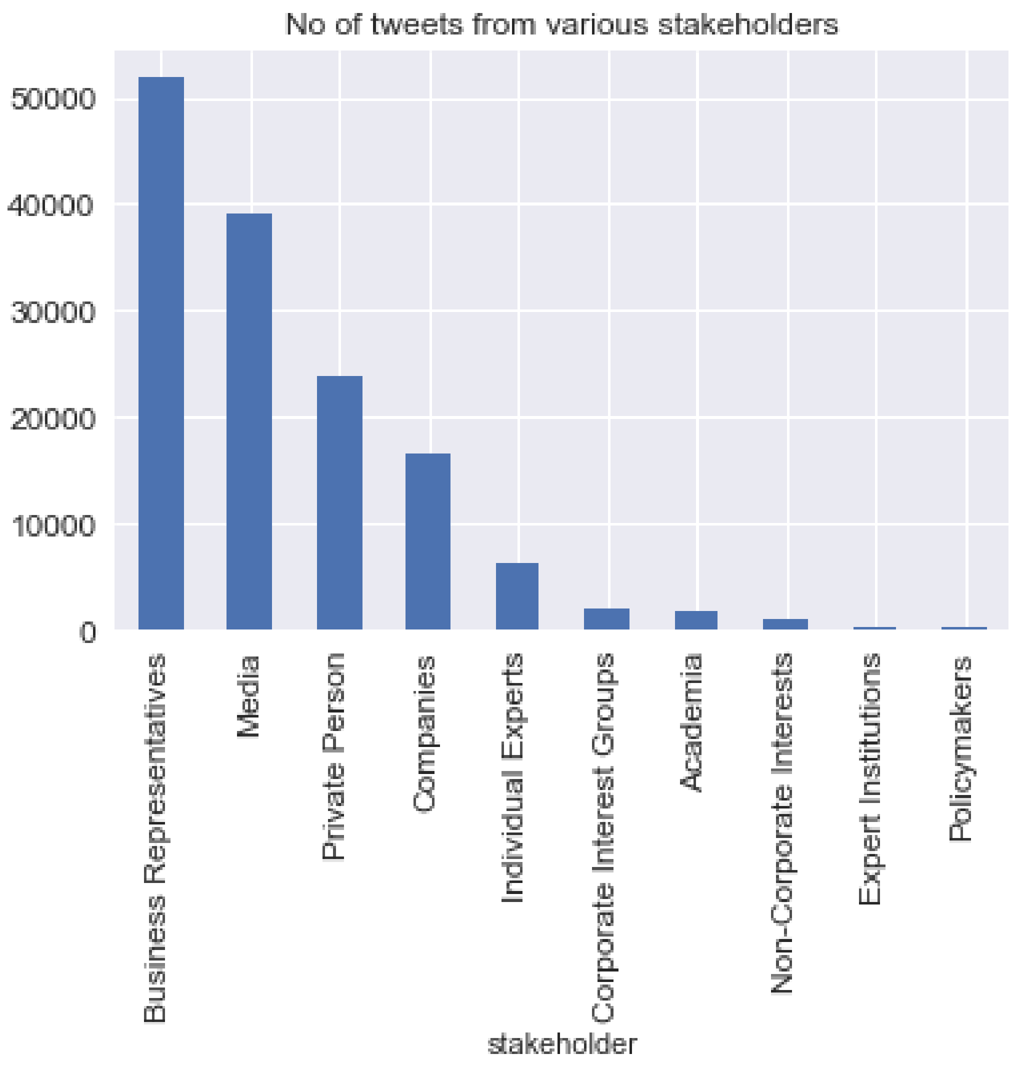
stakeholder_count.sort() - it will sort the dataframe by the stakeholder names, but that won't serve any purpose - Let's try three different things * sort the dataframe by Number of Tweets * sort by No of Users * sort by No of Different Location for each stakeholder

```
In [19]: stakeholder_count = stakeholder_count.sort(['Number_of_tweets'], ascending=False)
         stakeholder_count

/Library/Frameworks/Python.framework/Versions/3.5/lib/python3.5/site-packages/ipykernel/__main__
  if __name__ == '__main__':


Out[19]:                            Num_diff_locations  Number_of_tweets  \
         stakeholder
         Ambiguous                               12884            206094
         Business Representatives                 2352             51831
         Media                                     754             39125
         Private Person                           4620             23744
         Companies                                1460             16582
         Individual Experts                        629              6294
         Corporate Interest Groups                 246              2103
         Academia                                  372              1716
         Non-Corporate Interests                   201              1045
         Expert Institutions                        79               327
         Policymakers                              118               292

                                    Number_of_users
         stakeholder
         Ambiguous                            38117
         Business Representatives              6113
         Media                                 1662
         Private Person                        8577
         Companies                             3072
         Individual Experts                     989
         Corporate Interest Groups              433
         Academia                               501
         Non-Corporate Interests                275
         Expert Institutions                     94
         Policymakers                           158

In [20]: # 'Let's remove ambigous stakeholder row from our data frame
         stakeholder_count = stakeholder_count.drop('Ambiguous', axis = 0)
         stakeholder_count

Out[20]:                            Num_diff_locations  Number_of_tweets  \
         stakeholder
         Business Representatives                 2352             51831
         Media                                     754             39125
         Private Person                           4620             23744
         Companies                                1460             16582
```

```
Individual Experts                       629              6294
Corporate Interest Groups                246              2103
Academia                                 372              1716
Non-Corporate Interests                  201              1045
Expert Institutions                       79               327
Policymakers                             118               292

                           Number_of_users
stakeholder
Business Representatives              6113
Media                                 1662
Private Person                        8577
Companies                             3072
Individual Experts                     989
Corporate Interest Groups              433
Academia                               501
Non-Corporate Interests                275
Expert Institutions                     94
Policymakers                           158
```

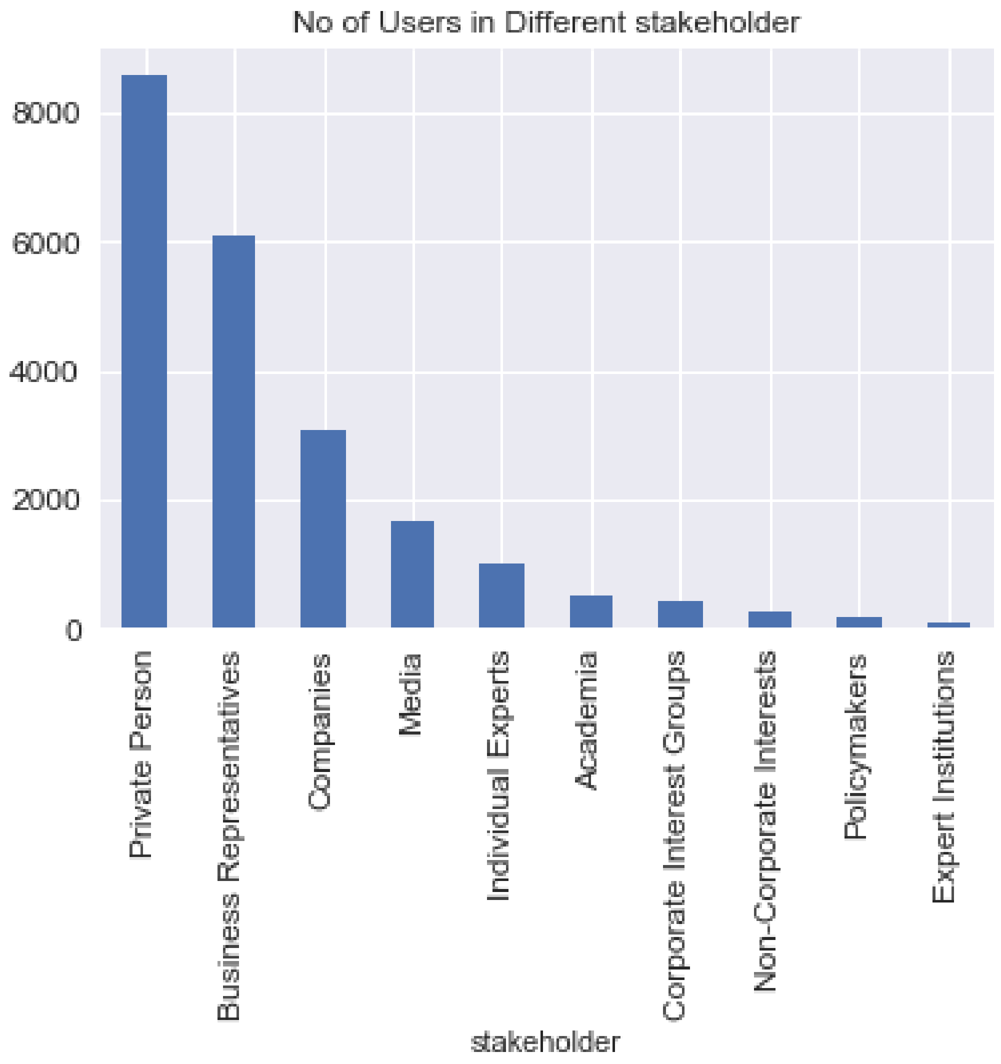
** It is interesting to see how many tweets are coming from what stack holder and how many different locations and how many users form that field are there.**

```
In [21]: stakeholder_count['Number_of_tweets'].plot(kind='bar', title = "No of tweets from vario
```



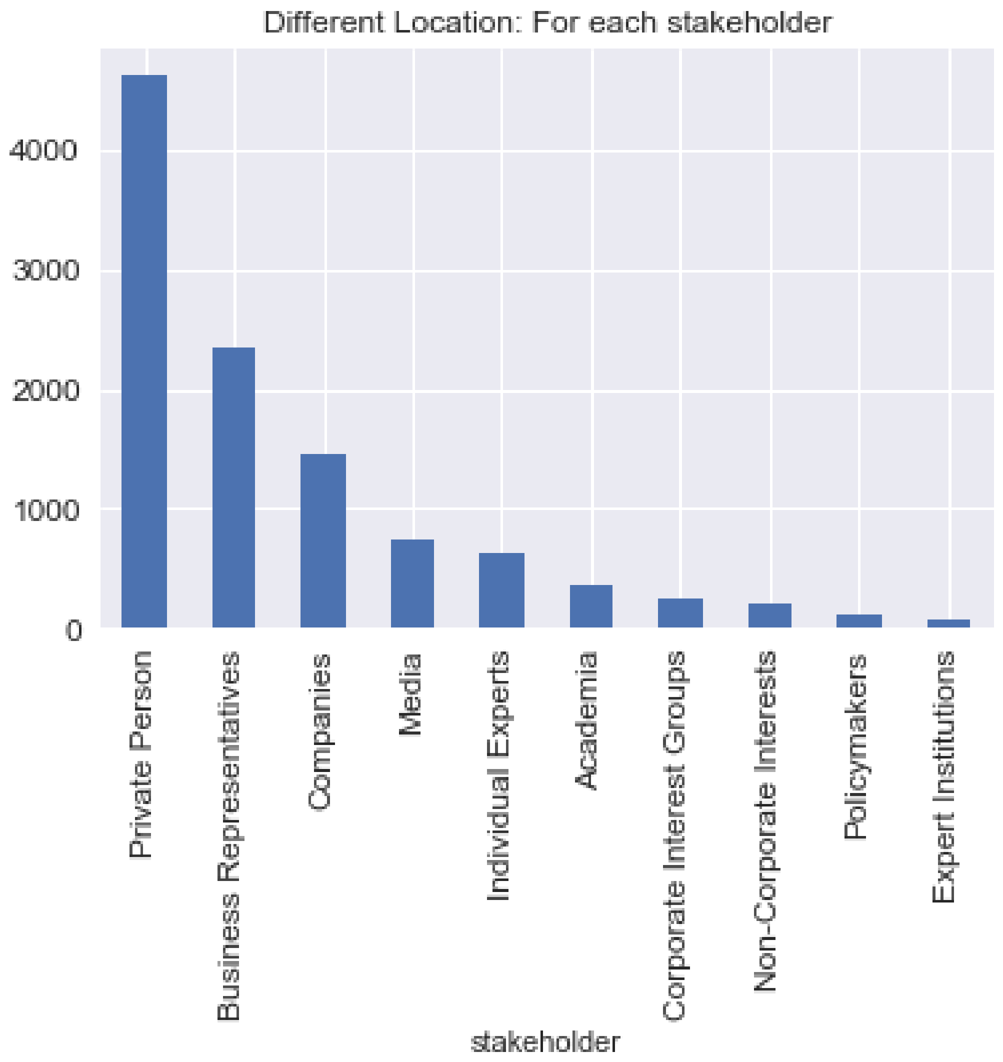
** It seems People in Academia aren't much interested in FinTech and policy maker don't even think about it. **

```
In [22]: stakeholder_count.sort(['Number_of_users'], ascending=False)['Number_of_users'].plot(ki

/Library/Frameworks/Python.framework/Versions/3.5/lib/python3.5/site-packages/ipykernel/__main__
  if __name__ == '__main__':
```



** No of Twitter Users who are interested in FinTech are mostly Private Person or Business Representative; Policymakers and Expert Instittution have the Least Number of Fintech Interested Users. **

```
In [23]: stakeholder_count.sort(['Num_diff_locations'], ascending=False)['Num_diff_locations'].p

/Library/Frameworks/Python.framework/Versions/3.5/lib/python3.5/site-packages/ipykernel/__main__
  if __name__ == '__main__':
```



** Fintech Interested Twitter Users come from various diffent location, but most diverse of that group is Private Person and Business Representatives and Least Diverse is Policymakers and Expert Institutions. **

0.4 Let's Analyse our Twitter Data with Time Period Perspective

```
In [24]: print('shape of the DataFrame:\n',df.shape)
         df.head(2)

shape of the DataFrame:
 (349153, 10)


Out[24]:      topic                                              tweet            user  \
         0  Fintech  #bitcoin #fintech Fedcoin: The U.S. Will Issue...  Satoshinet_com
```

```
1  Fintech  RT @guzmand: No one innovation is a silver bul...    anas_sulaimi

                  date                                         description  \
0 2017-01-12 17:14:10  #bitcoin #fintech Get Free BitCoin - BitCoin F...
1 2017-01-12 17:14:12  GUtech Graduate #IT Consultant: #cybersecurity...

       location followers stakeholder  year  month
0   Orlando, FL        \N   Ambiguous  2017      1
1  Muscat, Oman        \N   Ambiguous  2017      1
```

```
In [25]: print("Concerting our Date column to panda Date format ... It's the Time the user Tweet
         df.date = pd.to_datetime(df['date'])
```

```
Concerting our Date column to panda Date format ... It's the Time the user Tweeted ...
```

0.4.1 Let's make our tweet time as the index of the data frame. It will be easier to visualise time based trends that way.

```
In [26]: df = df.set_index(['date'])
         df.head(2)
```

```
Out[26]:                        topic  \
         date
         2017-01-12 17:14:10  Fintech
         2017-01-12 17:14:12  Fintech


                                                                        tweet  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Fedcoin: The U.S. Will Issue...
         2017-01-12 17:14:12  RT @guzmand: No one innovation is a silver bul...

                                       user  \
         date
         2017-01-12 17:14:10  Satoshinet_com
         2017-01-12 17:14:12    anas_sulaimi

                                                                   description  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Get Free BitCoin - BitCoin F...
         2017-01-12 17:14:12  GUtech Graduate #IT Consultant: #cybersecurity...

                                   location followers stakeholder  year  month
         date
         2017-01-12 17:14:10   Orlando, FL        \N   Ambiguous  2017      1
         2017-01-12 17:14:12  Muscat, Oman        \N   Ambiguous  2017      1
```

Let's collapse the DataFrame by time and generate plots of number of tweets over different timeperiod. I will be using groupby command to make a new data frame

```
In [27]: df.head()

Out[27]:                      topic  \
         date
         2017-01-12 17:14:10  Fintech
         2017-01-12 17:14:12  Fintech
         2017-01-12 17:14:12  Fintech
         2017-01-12 17:14:19  Fintech
         2017-01-12 17:14:26  Fintech

                                                                          tweet  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Fedcoin: The U.S. Will Issue...
         2017-01-12 17:14:12  RT @guzmand: No one innovation is a silver bul...
         2017-01-12 17:14:12  How Smart Contracts Are Changing Financial Ser...
         2017-01-12 17:14:19  Satoshium Project Announced &amp; White Paper ...
         2017-01-12 17:14:26  RT @sdubois: NYSE to allow all US listed secur...

                                        user  \
         date
         2017-01-12 17:14:10  Satoshinet_com
         2017-01-12 17:14:12    anas_sulaimi
         2017-01-12 17:14:12    bitcoinagile
         2017-01-12 17:14:19    satoshiumorg
         2017-01-12 17:14:26    BelieRxbelle

                                                                    description  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Get Free BitCoin - BitCoin F...
         2017-01-12 17:14:12  GUtech Graduate #IT Consultant: #cybersecurity...
         2017-01-12 17:14:12  Streaming News: Bitcoin, Blockchain & Beyond #...
         2017-01-12 17:14:19                                     Minted Bitcoin
         2017-01-12 17:14:26  #Lovatic. #TeamBreezy. Musty mouthed Thot Bots...

                                          location followers stakeholder  year  month
         date
         2017-01-12 17:14:10           Orlando, FL        \N   Ambiguous  2017      1
         2017-01-12 17:14:12          Muscat, Oman        \N   Ambiguous  2017      1
         2017-01-12 17:14:12  Matter Doesn't Matter        \N       Media  2017      1
         2017-01-12 17:14:19       Santa Monica, CA        \N   Ambiguous  2017      1
         2017-01-12 17:14:26              Chicago          \N   Ambiguous  2017      1

In [28]: def t(x):
             return pd.Series(dict(Number_of_tweets = x['tweet'].count()))

In [29]: daily_count = df.groupby(df.index.date).apply(t)
         print(len(daily_count))
         daily_count.head(2)
```

```
58
```

```
Out[29]:             Number_of_tweets
        2017-01-12              1663
        2017-01-13              6807
```

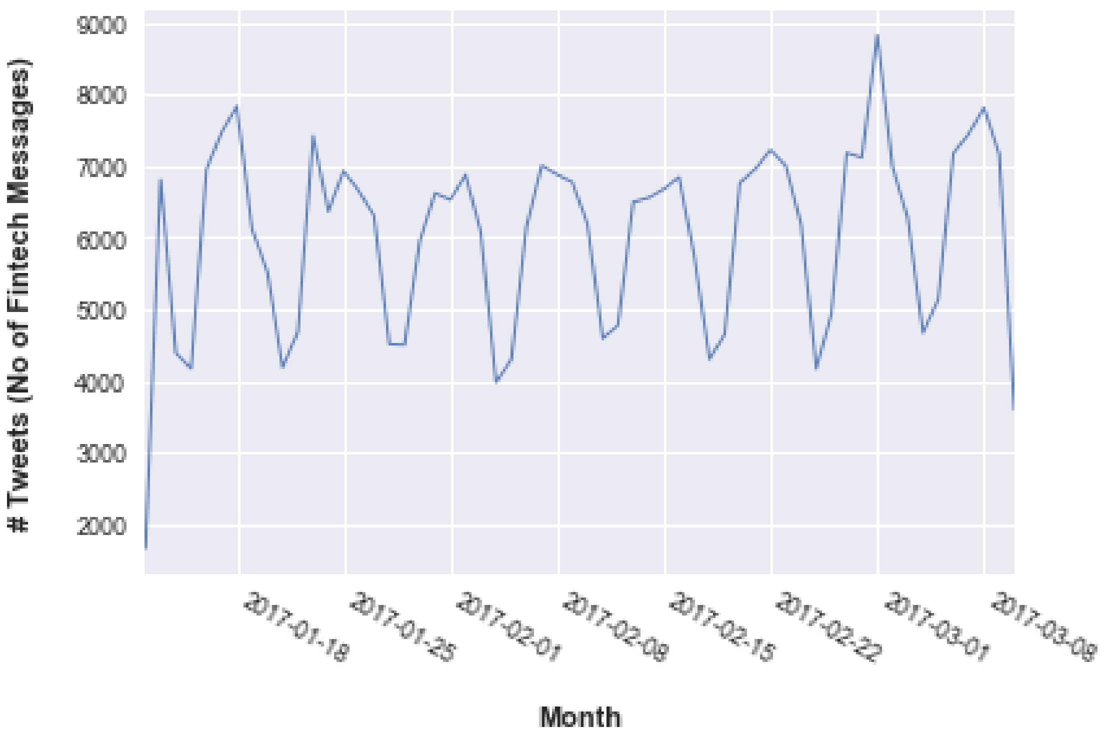
```
In [30]: daily_count.index.name = 'Date'
         daily_count.head(2)
```

```
Out[30]:             Number_of_tweets
        Date
        2017-01-12              1663
        2017-01-13              6807
```

0.4.2 Let's plot this to get insight about Fintech Tweet Activity

```
In [ ]:
```

```
In [31]: daily_plot = daily_count['Number_of_tweets'].plot(kind='line', lw=1, alpha=0.9, legend=

         daily_plot.set_xlabel('Month', weight='bold', labelpad=15);    #SET X-AXIS LABEL; ADD P
         daily_plot.set_ylabel('# Tweets (No of Fintech Messages)', weight='bold', labelpad=15);

         plt.xticks(fontsize = 9, rotation = -30, ha ="left");  #SET FONT PROPERTIES OF X-AXIS T
         plt.yticks(fontsize = 9);                              #SET FONT PROPERTIES OF Y-AXIS T

         daily_plot.legend_ = None;
         daily_plot.tick_params(axis='x', pad=5); #SET PADDING ABOVE X-AXIS LABELS
         #Set x axis label on top of plot, set label text --> https://datasciencelab.wordpress.c
         #daily_plot.xaxis.set_label_position('top')

         #plt.savefig('daily counts.png', bbox_inches='tight', dpi=300, format='png')
```



** Isn't is surprising that people Were more interted in FinTech in March Month. May be Looking for new place to Invest in March. **

```
In [32]: ## Let's calculate and predict NO of tweets Per day of the week
         weekday_count = df.groupby(df.index.weekday).apply(t)
         print(len(weekday_count))
         weekday_count
```

```
7
```

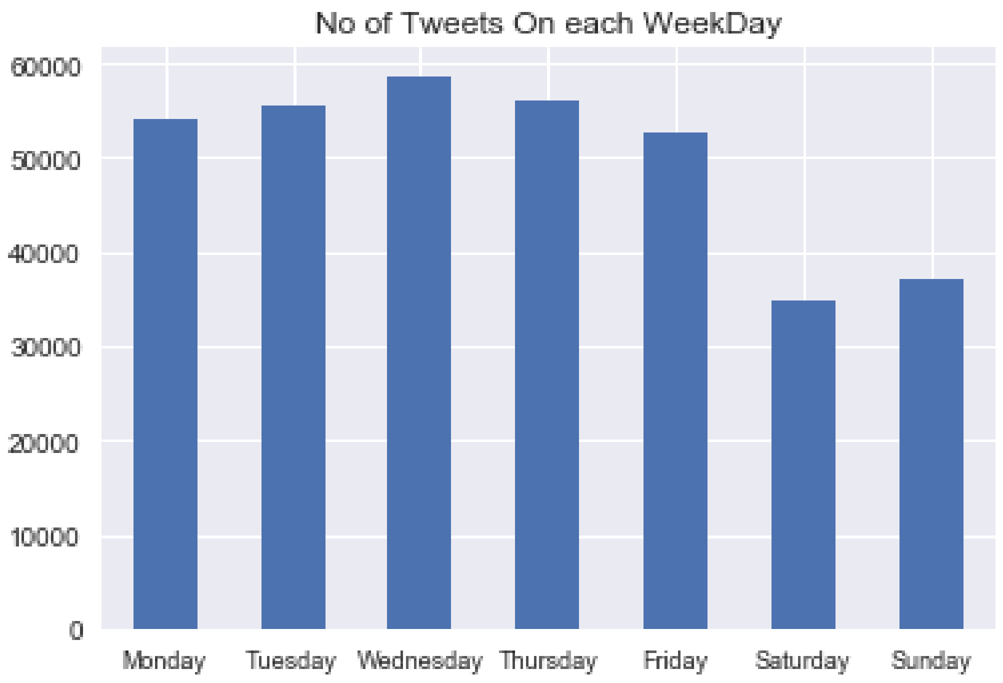
```
Out[32]:    Number_of_tweets
         0             54109
         1             55539
         2             58719
         3             56092
         4             52713
         5             34814
         6             37167
```

```
In [33]: days = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday', 'Sunday']
         weekday_count['day'] = days
         weekday_count
```

```
Out[33]:    Number_of_tweets        day
        0              54109     Monday
        1              55539    Tuesday
        2              58719  Wednesday
        3              56092   Thursday
        4              52713     Friday
        5              34814   Saturday
        6              37167     Sunday
```

```
In [34]: #Can be done by this code too, but above one is better and easy to remeber
         #print("let's get it by Weekday Name . . .")
         #weekday_name_count = df.groupby(df.index.weekday_name).apply(t)
         #print(len(weekday_name_count))
         #weekday_name_count
```

```
In [35]: day_of_week_plot = weekday_count['Number_of_tweets'].plot(kind='bar', title = "No of Tw
         plt.xticks(np.arange(7), weekday_count['day'], rotation = 0, fontsize = 9);
```



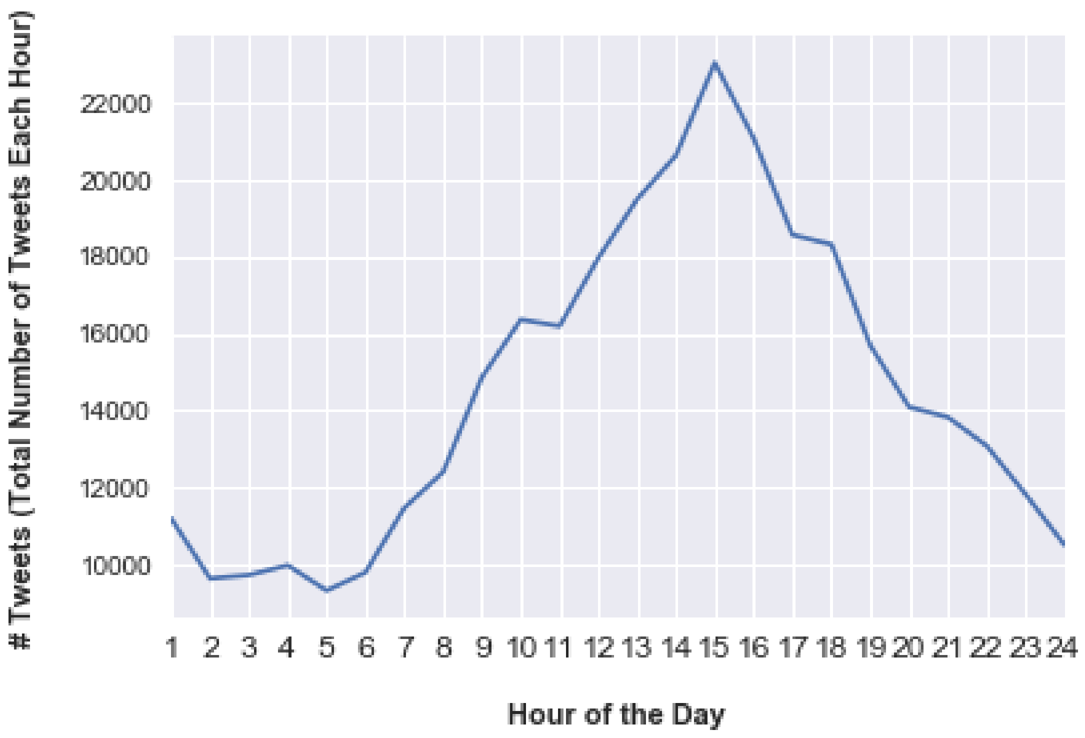
** Another Great Insight: More Tweet about Fintech on Weekdays, weekends are for more lighter stuff...**

```
In [36]: # Let's make another dataset for hour of the day count
         print("calculating No of Tweets Each Hour the day... Little patience sir, I almost ther
         hourly_count = df.groupby(df.index.hour).apply(t)
         print("Total No of Hours:\n",len(hourly_count))
         hourly_count.index.name = "Hour"
         hourly_count
```

```
calculating No of Tweets Each Hour the day... Little patience sir, I almost there!
Total No of Hours:
 24
```

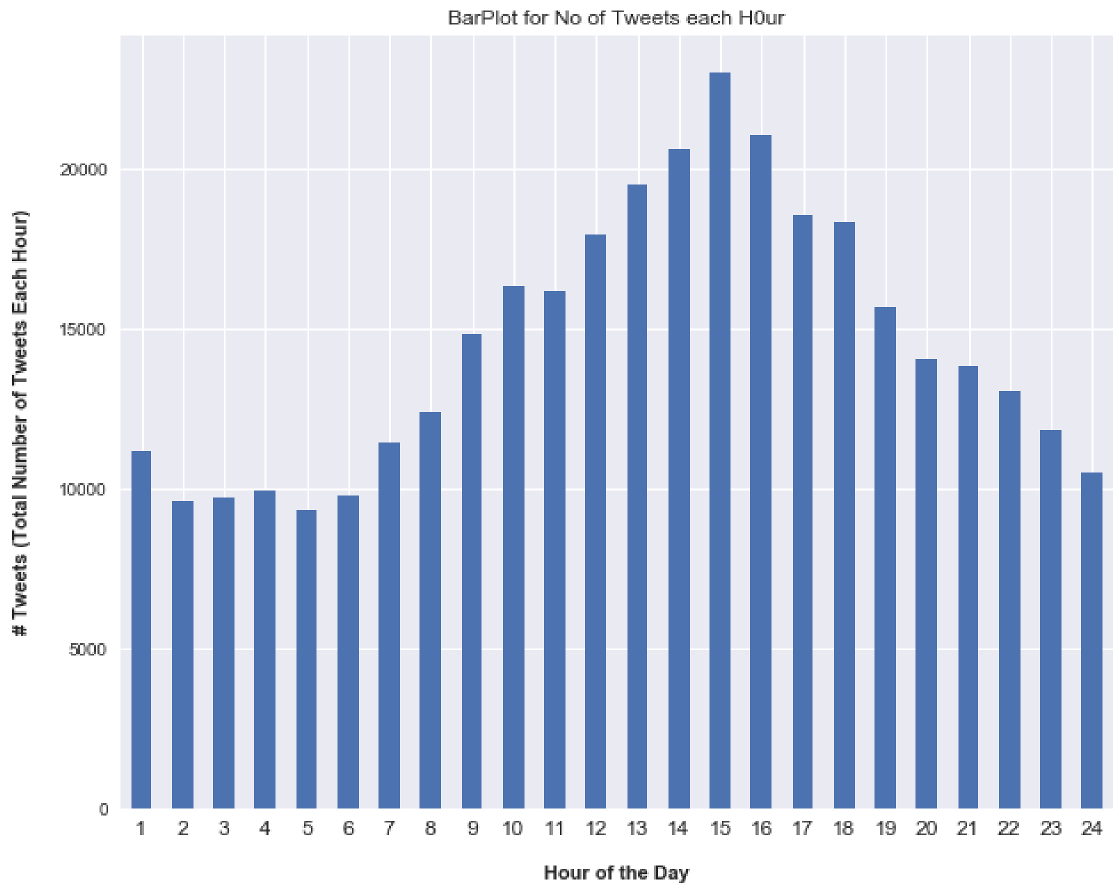
```
Out[36]:       Number_of_tweets
         Hour
         0                11188
         1                 9632
         2                 9722
         3                 9976
         4                 9317
         5                 9791
         6                11466
         7                12402
         8                14870
         9                16370
         10               16203
         11               17976
         12               19507
         13               20643
         14               23057
         15               21089
         16               18576
         17               18328
         18               15700
         19               14094
         20               13828
         21               13086
         22               11825
         23               10507
```

```
In [37]: #plt.rcParams['figure.figsize'] = (10,8)

         hourly_plot = hourly_count['Number_of_tweets'].plot(kind='line');
         hours = list(range(1,25));                                                   #GENERATE LIS
         plt.xticks(np.arange(24), hours, rotation = 0,fontsize = 12);                     #USE THE

         hourly_plot.set_xlabel('Hour of the Day', weight='bold', labelpad=15);      #SET X-AXIS
         hourly_plot.set_ylabel('# Tweets (Total Number of Tweets Each Hour)', weight='bold', la

         #savefig('hourly counts - line graph.png', bbox_inches='tight', dpi=300, format='png')
```



** So, Tweeples are Tweeting about FinTech more in the evening and most at 3:00pm, but they are tweeting all the time. Don't they sleep.**

```
In [38]: plt.rcParams['figure.figsize'] = (10,8)

         hourly_plot = hourly_count['Number_of_tweets'].plot(kind='bar', title = "BarPlot for No
         hours = list(range(1,25));                                                  #GENERATE LIS
         plt.xticks(np.arange(24), hours, rotation = 0,fontsize = 12);                   #USE THE

         hourly_plot.set_xlabel('Hour of the Day', weight='bold', labelpad=15);      #SET X-AXIS 
         hourly_plot.set_ylabel('# Tweets (Total Number of Tweets Each Hour)', weight='bold', la
```



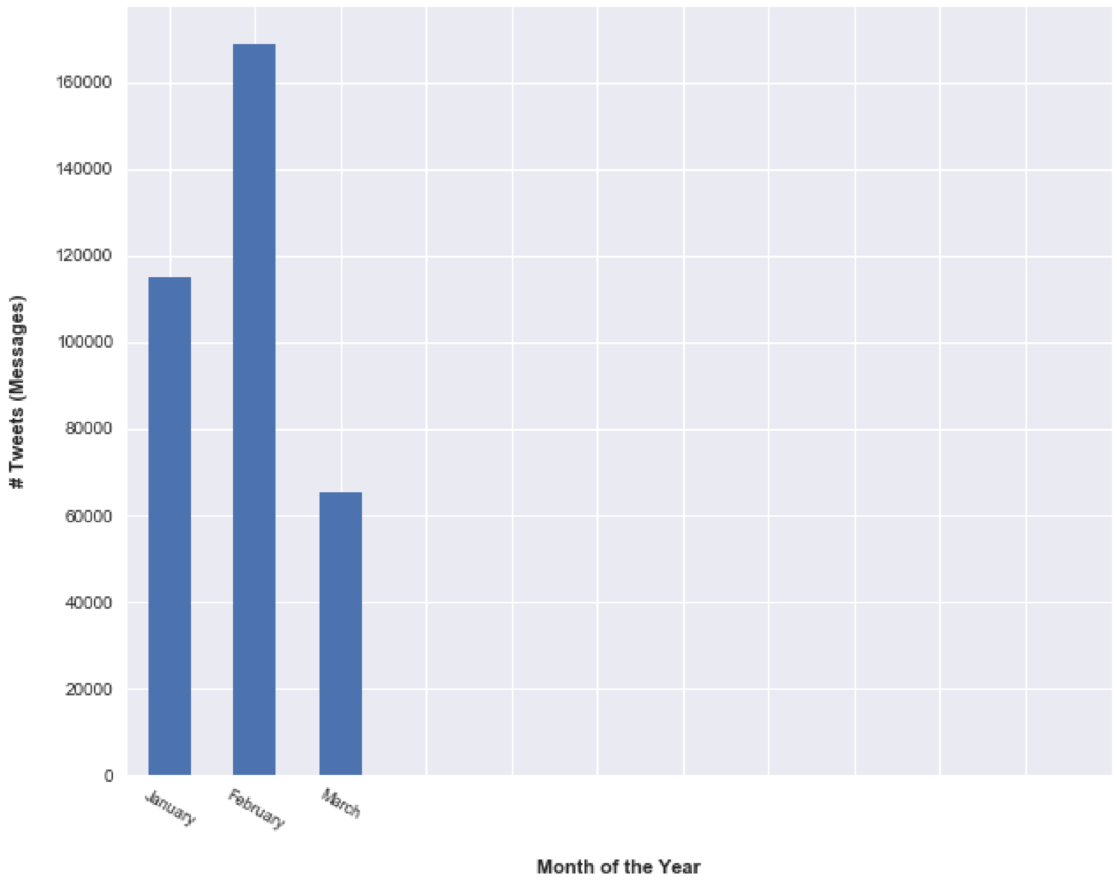
0.5 Let's make a monthly Count Plots: What month Tweeples like FinTech Most

```
In [39]: monthly_count = df.groupby(df.index.month).apply(t)

         print("calculating No of Tweets Each Month... Little patience sir, I almost there!")
         print("We have Data for %s Months only." %len(monthly_count))

         monthly_count.index.name = "Month"

         monthly_count
```

```
calculating No of Tweets Each Month... Little patience sir, I almost there!
We have Data for 3 Months only.
```

```
Out[39]:        Number_of_tweets
         Month
         1                115071
         2                168974
         3                 65108
```

```
In [40]: monthly_plot = monthly_count['Number_of_tweets'].plot(kind='bar');

         months_name = ['January', 'February', 'March'];
         plt.xticks(np.arange(12), months_name, rotation = -30,fontsize = 9);                #

         monthly_plot.set_xlabel('Month of the Year', weight='bold', labelpad=15);  #SET X-AXIS
         monthly_plot.set_ylabel('# Tweets (Messages)', weight='bold', labelpad=15); #SET Y-AXIS
         daily_plot.tick_params(axis='x', pad=5);                                   #SET PADDING

         #daily_plot.legend_ = None;                                                 #TURN OFF L

         #savefig('monthly counts - bar graph.png', bbox_inches='tight', dpi=300, format='png')
```



** More Fintech Tweets in February, If Fintech and Spring related Somehow! **
*** We can do the same for Minutes as well as Second (Really that would be a huge number)
***

1 Let's Do someWork on Hashtags: What exactly Tweeples like about FinTech

```
In [41]: df.head(2)
```

```
Out[41]:                           topic  \
         date
         2017-01-12 17:14:10  Fintech
         2017-01-12 17:14:12  Fintech

                                                                         tweet  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Fedcoin: The U.S. Will Issue...
         2017-01-12 17:14:12  RT @guzmand: No one innovation is a silver bul...

                                          user  \
         date
         2017-01-12 17:14:10  Satoshinet_com
         2017-01-12 17:14:12    anas_sulaimi

                                                                   description  \
         date
         2017-01-12 17:14:10  #bitcoin #fintech Get Free BitCoin - BitCoin F...
         2017-01-12 17:14:12  GUtech Graduate #IT Consultant: #cybersecurity...

                                    location followers stakeholder  year  month
         date
         2017-01-12 17:14:10    Orlando, FL        \N   Ambiguous  2017      1
         2017-01-12 17:14:12  Muscat, Oman        \N   Ambiguous  2017      1
```

```
In [42]: # Let's reload the original provided DataFrame
         print("Loading the Original Provided Pure DataFrame...Its Big!")
         df = pd.read_pickle("FinTech_cleaned.pkl")
         print("Showing you First two rows ... ")
         df.head(2)
```

```
Loading the Original Provided Pure DataFrame...Its Big!
Showing you First two rows ...
```

```
Out[42]:      topic                                              tweet           user  \
         0  Fintech  #bitcoin #fintech Fedcoin: The U.S. Will Issue...  Satoshinet_com
         1  Fintech  RT @guzmand: No one innovation is a silver bul...    anas_sulaimi

                                      date  \
         0  Thu Jan 12 17:14:10 +0000 2017
         1  Thu Jan 12 17:14:12 +0000 2017
```

```
                                        description      location followers  \
0  #bitcoin #fintech Get Free BitCoin - BitCoin F...   Orlando, FL        \N
1  GUtech Graduate #IT Consultant: #cybersecurity...  Muscat, Oman        \N

  stakeholder
0   Ambiguous
1   Ambiguous
```

```
In [43]: print('Checking if provided tweets has retweets or just the original tweet: *&^%$: Some
         df[df['tweet']=='THIS IS A RETWEET']
         print("Seems it's empty: No retweets then")
         print("We are good to work on this DataSet: It's Really Clean... My Goodness.")
```

```
Checking if provided tweets has retweets or just the original tweet: *&^%$: Some Hidden magic...
```

```
Out[43]: Empty DataFrame
         Columns: [topic, tweet, user, date, description, location, followers, stakeholder]
         Index: []
```

```
Seems it's empty: No retweets then
We are good to work on this DataSet: It's Really Clean... My Goodness.
```

** Now we can do Two things : ** - We can analyse the hashtags used in description column - We can alalyse hashtags used in tweet column Let's do both but one at a time.

```
In [44]: description_list = []                              #CREATE EMPTY LIST
         for i in df.description:    #LOOP OVER EVERY CELL IN ENTITIES_HASHTAGS
             if pd.notnull(i):                              #IF CELL NOT EMPTY
                 tags = i.split()                           #SPLIT EACH CELL INTO SEPARATE HASHTAGS
                 for t in tags:                             #FOR EACH TAG IN THE CELL
                     t = t.replace('#','')                              #ADD '#' SYMBOL TO BEGINNING OF
                     t = t.replace(',', '')                 #REMOVE COMMAS FROM END OF TAGS
                     t = t.lower()                          #MAKE TAG LOWER CASE
                     description_list.append(t)                 #ADD TAG TO OUR LIST
         print(len(description_list))                           #PRINT NUMBER OF ITEMS IN OUR LIST
         description_list[:5]
```

```
5235517
```

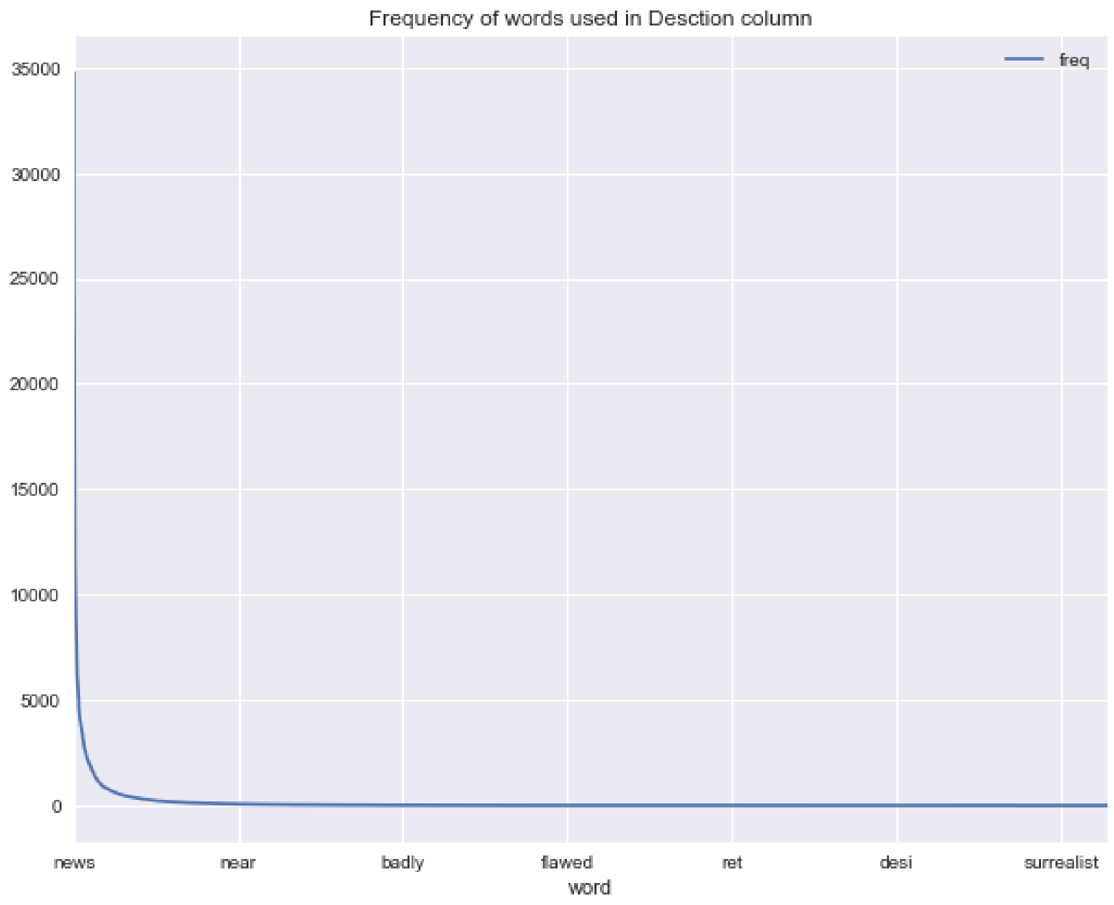
```
Out[44]: ['bitcoin', 'fintech', 'get', 'free', 'bitcoin']
```

** We have a lot of stopwords, non english words and website address, we need to drop them all. **

```
In [45]: import nltk
         words = set(nltk.corpus.words.words())
         stopwords = set(nltk.corpus.stopwords.words())

         description_list = [w for w in description_list if w in words and w not in stopwords]
         description_list[:5] # list of final clean words

Out[45]: ['get', 'free', 'faucet', 'faucet', 'list']

In [46]: description_frame = pd.DataFrame(description_list, columns=['word'])
         description_frame.head()

Out[46]:      word
         0     get
         1    free
         2  faucet
         3  faucet
         4    list

In [47]: def t(x):
             return pd.Series(dict(freq = x['word'].count()))

In [48]: description_count = description_frame.groupby('word').apply(t)
         description_count.head()

Out[48]:          freq
         word
         aa          1
         aam         1
         aba         2
         abaca       2
         abalone     1

In [49]: description_count  = description_count.sort('freq', ascending=False)
         print("Most Used Words in Tweet Description")
         description_count.head()
         print("----------------------------")
         print("Least Used Words in Tweet Description")
         description_count.tail()
         print("----------------------------")

Most Used Words in Tweet Description


/Library/Frameworks/Python.framework/Versions/3.5/lib/python3.5/site-packages/ipykernel/__main__
  if __name__ == '__main__':


Out[49]:              freq
         word
         news        34747
         technology  24316
         digital     24108
         innovation  24053
         director    22437

---------------------------
Least Used Words in Tweet Description


Out[49]:             freq
         word
         horned         1
         horizontal     1
         skinned        1
         hora           1
         aa             1

---------------------------
```

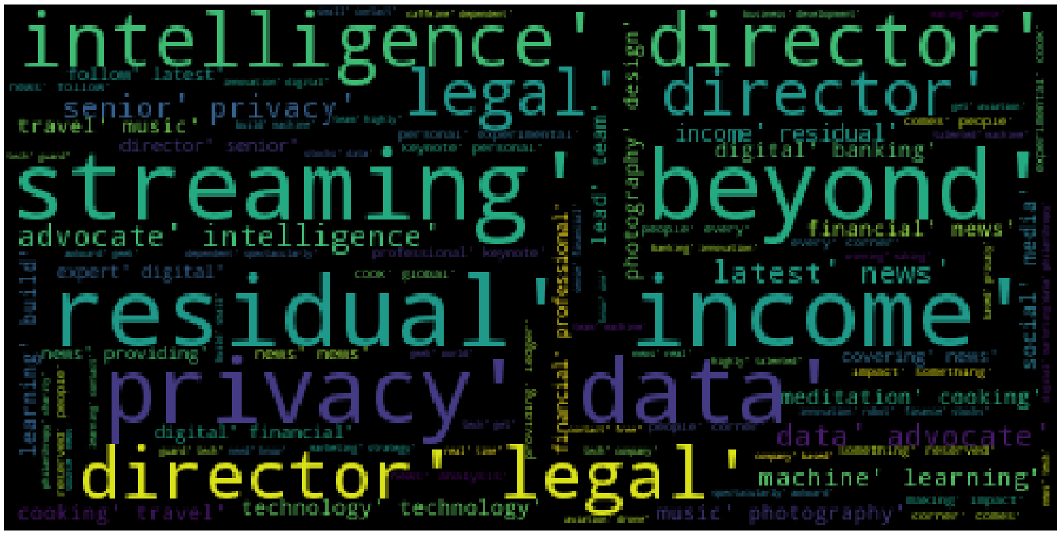
** Peole are describing FinTech most likely as in NEWS, Digital,Innovation and Latest Technology and least likely as Horned or skinned. Therefore, we can say; Tweeple's (people on twitter) in this dataset has a positive feeling towards FinTech. **

```
In [50]: description_count.plot(title = 'Frequency of words used in Desction column');
```



```
In [ ]:

In [51]: print("WordCloud of Most Used words in Description")
         description_wordcloud = WordCloud().generate(str(description_list));
         plt.imshow(description_wordcloud);
         plt.axis("off");
         plt.show();
```

```
WordCloud of Most Used words in Description
```



1.1 Let's do this all for tweets

```
In [52]: tweet_list = []                                 #CREATE EMPTY LIST
         for i in df.tweet:    #LOOP OVER EVERY CELL IN ENTITIES_HASHTAGS
             if pd.notnull(i):                             #IF CELL NOT EMPTY
                 tags = i.split()                          #SPLIT EACH CELL INTO SEPARATE HASHTAGS
                 for t in tags:                            #FOR EACH TAG IN THE CELL
                     t = t.replace('#','')                             #ADD '#' SYMBOL TO BEGINNING OF
                     t = t.replace(',', '')                #REMOVE COMMAS FROM END OF TAGS
                     t = t.lower()                         #MAKE TAG LOWER CASE
                     tweet_list.append(t)                #ADD TAG TO OUR LIST
         print(len(tweet_list))                           #PRINT NUMBER OF ITEMS IN OUR LIST
         tweet_list[:5]
```

```
5315638
```

```
Out[52]: ['bitcoin', 'fintech', 'fedcoin:', 'the', 'u.s.']
```

** We have a lot of stopwords, non english words and website address, we need to drop them all. **

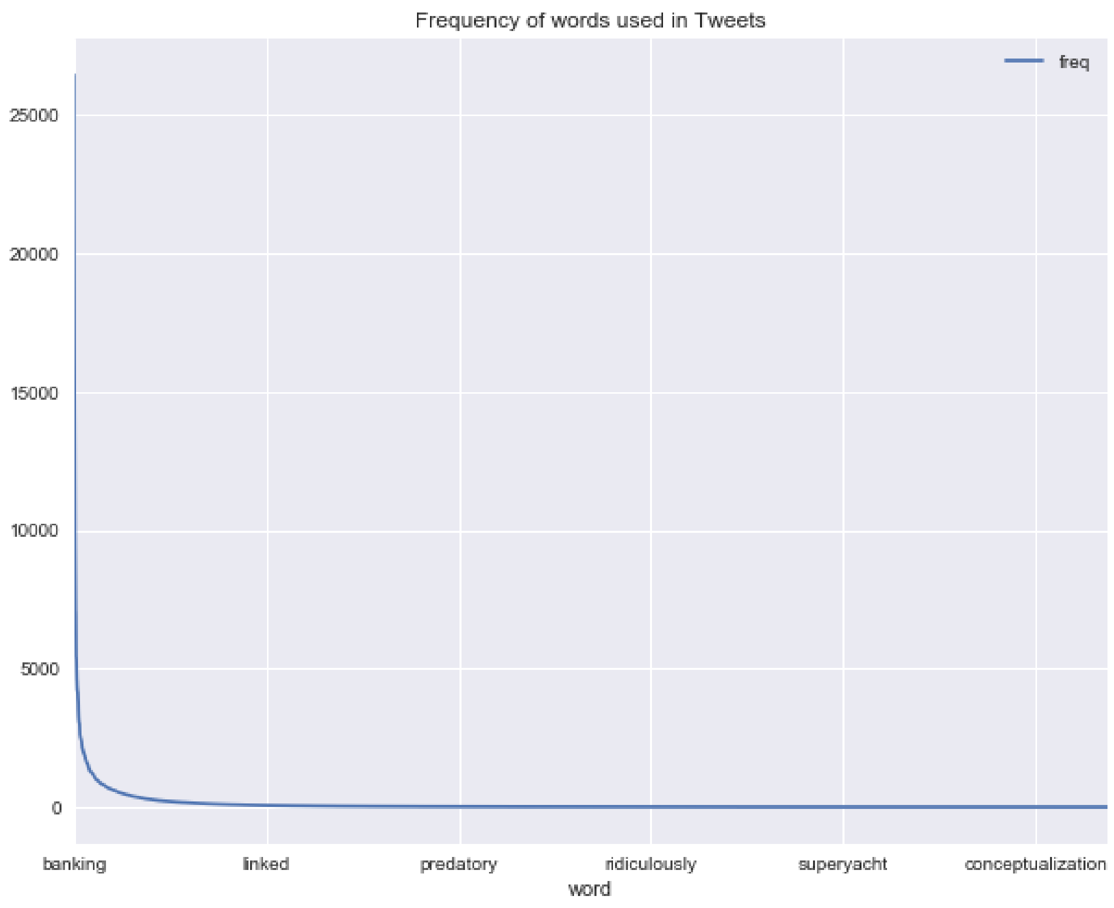
```
In [53]: import nltk
         words = set(nltk.corpus.words.words())
         stopwords = set(nltk.corpus.stopwords.words())

         tweet_list = [w for w in tweet_list if w in words and w not in stopwords]
         tweet_list[:5] # list of final clean words
```

```
Out[53]: ['issue', 'use', 'one', 'innovation', 'silver']

In [54]: tweet_frame = pd.DataFrame(tweet_list, columns=['word'])
         tweet_frame.head()

Out[54]:          word
         0       issue
         1         use
         2         one
         3  innovation
         4      silver

In [55]: def t(x):
             return pd.Series(dict(freq = x['word'].count()))

In [56]: tweet_count = tweet_frame.groupby('word').apply(t)
         tweet_count.head()

Out[56]:            freq
         word
         aa            1
         aba          77
         abacus       15
         abandon       4
         abandoned     5

In [57]: tweet_count  = tweet_count.sort('freq', ascending=False);
         print("Most Used Words in Tweets")
         tweet_count.head()
         print("---------------------------")
         print("Least Used Words in Tweets")
         tweet_count.tail()

Most Used Words in Tweets


/Library/Frameworks/Python.framework/Versions/3.5/lib/python3.5/site-packages/ipykernel/__main__
  if __name__ == '__main__':


Out[57]:          freq
         word
         banking  26458
         via      21460
         thanks   17192
         latest   16825
         tech     16767

---------------------------
Least Used Words in Tweets
```

```
Out[57]:                freq
         word
         deflationary      1
         renegade          1
         deficit           1
         deficiency        1
         aa                1
```

```
In [58]: print("---------------------------")
         tweet_count.plot(title = 'Frequency of words used in Tweets');
```

```
---------------------------
```



** Peole are describing FinTech most likely as Banking and Latest Tech and least likely as deflationary or renegade. Therefore, we can say; Tweeple's (people on twitter) in this dataset has a positive feeling towards FinTech. **

```
In [59]: tweet_wordcloud = WordCloud().generate(str(tweet_list));
         plt.imshow(tweeta_wordcloud);
         plt.axis("off");
         plt.show();
```

```
---------------------------------------------------

NameError         Traceback (most recent call last)

<ipython-input-59-4fff8348a90e> in <module>()
  1 tweet_wordcloud = WordCloud().generate(str(tweet_list));
----> 2 plt.imshow(tweeta_wordcloud);
  3 plt.axis("off");
  4 plt.show();


NameError: name 'tweeta_wordcloud' is not defined
```

```
In [ ]:
```

1.2 Additionaly we can create new features using countvectoriser function and make plots about what are most use words according to location as well as stakeholders

```
In [ ]: from sklearn.feature_extraction.text import CountVectorizer
        cv = CountVectorizer()
```

*** I tried but my computer(4GB RAM) is freezing while vectorising words in tweets or description. I will try to tune the parameter to make it work in a low memory system. *** ....

```
In [ ]:
```