File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

Anatomy of a Viral Moment

To learn what kinds of data and analyses I could glean from Twitter using Python, I pulled over 13,500 Tweets posted during the live broadcast of the 2022 Academy Awards on March 27, 2022, from around the moment actor Will Smith slapped comedian Chris Rock, until a few moments after Smith accepted the award for Best Actor. In Pacific time, about 7:27pm to about 8:30pm.

I used Tweepy to access the Twitter API and returned results in a Jupyter notebook. Specifically, I searched for Tweets that included the words "will" and "slap" as well as Tweets that included "oscars" and "slap," excluding retweets. This is not a total list of Tweets during this time period, mainly due to limitations using Twitter's (free) Elevated API (versus Academic or Enterprise). I then created a dataframe with pandas, learned various facts and created data visualizations.

Importing Libraries and Preparing the Data

In [4]:
```
# Importing libraries

import os
import numpy as np
import glob
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.colors
import seaborn as sns
import matplotlib.dates as mdates
from pandas import DataFrame
from datetime import datetime
from matplotlib.dates import date2num
from pandas import Series
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
```

In [5]:
```
# Merging many files of Tweets

merged = os.path.join("Tweets/tweets*.csv")
tweets = glob.glob(merged)
df = pd.concat(map(pd.read_csv, tweets), ignore_index=True)
```

Let's check out what I've got to work with.

In [6]:
```
# Looking at the data. (I changed the column titles in the data collection process.)

df.head()
```

Out[6]:

	Time	Tweet	Source	ID	Name	Username	Location	Verified?	Bio
0	2022-03-28 02:28:24+00:00	Man wtf why tf would will smith slap chris roc...	Twitter for iPhone	1508269746684416001	Camyoncè ��	cammybad_azz	Atlanta, GA	False	22 with NO KIDS! Snapchat: xxwallywah travel h...
1	2022-03-28 02:28:24+00:00	Wait. Did Will Smith really slap Chris Rock an...	Twitter for iPhone	1508269744666943502	Bryan Levine	Bryan_Levine	Florida	True	Likely tweeting about sports, music, Seinfeld ...
2	2022-03-28 02:28:23+00:00	Did Will Smith just slap the shit out of Chris...	Twitter for iPhone	1508269742972452875	T-Hill	iambiggum	Oak Cliff Tx.	False	Living life to the fullest extent follow my IG...
3	2022-03-28 02:28:23+00:00	did will just slap the piss outta em	Twitter for iPhone	1508269742087413763	Jarred	JarreDuhh	NaN	False	Sports Junkie. Living for my Nanna and Granny ...
4	2022-03-28 02:28:23+00:00	@KarinaAnglada Did Will Smith really just slap...	Twitter for iPhone	1508269741726736385	Mhovey	MarkHoversen	NaN	False	Truth is.......I am Iron Man

Can we sort by time and get the first 10 Tweets in our dataframe, from the first seconds after it happened?

In [7]:
```python
# Converting the Time field from UTC to Pacific time (where I live)

df['Time'] = pd.to_datetime(df.Time, format='%Y-%m-%d %H:%M:%S')
df['Time'] = df['Time'].dt.tz_convert('US/Pacific')

# Sorting to see the first Tweets

df_bytime = df.sort_values(by='Time', ascending=True)

df_bytime.head()
```

Out[7]:

	Time	Tweet	Source	ID	Name	Username	Location	Verified?	Bio
99	2022-03-27 19:27:34-07:00	UHHHHHH DID WILL SMITH JUST SLAP AND CUSS AT C...	Twitter for iPhone	1508269538332323843	Ash ⁷ ☻ ▯	kookiesnaega	The Streets of Gwanju & Busan	False	uhhhh I like BTS, Anime, and Animal Crossing. ...
98	2022-03-27 19:27:36-07:00	Did will smith just bitch slap Chris rock…I lo...	Twitter for iPhone	1508269545823379459	dee	dblit99	NaN	False	they/them // I'm currently writing stuff! chec...
97	2022-03-27 19:27:37-07:00	Was that a real slap? #Oscars	Twitter for Android	1508269550139285512	������ B	Lici430	Bronx, NY	False	Pop Culture Fiend, HP Blerd, Trying to Survive...
96	2022-03-27 19:27:37-07:00	omg did will smith just slap chris rock? #Oscars	Twitter for iPhone	1508269550898401280	ᴀ ʟ ᴏ ᴅ ɪ ᴇ	sasssypanties	jersey ��	False	yes, i love the red sox ����
95	2022-03-27 19:27:38-07:00	what the fuck. did will really slap him #Oscars	Twitter for iPhone	1508269552265834502	Rahim	rahim77905922	NaN	False	GO BUCKS. Warriors and Manchester untied, J.co...

Looks like we have Tweets starting from 7:27:34pm Pacific!

In [8]:
```python
# Checking to see how many I have

df['Tweet'].count()
```

Out[8]:
```
13529
```

In [9]:
```python
# Making sure I didn't accidentally grab any duplicates

duplicates = df[df.duplicated(['ID'])]
duplicates
```

Out[9]:

Time	Tweet	Source	ID	Name	Username	Location	Verified?	Bio

Let's Start Analyzing!

Did People Think It Was Staged?

In [10]:
```python
# Finding all the Tweets in our dataframe including the word "fake" or "staged" or the phrase "was that real"

fake = df.loc[df['Tweet'].str.contains("fake", case=False)]
real = df.loc[df['Tweet'].str.contains("was that real", case=False)]
staged = df.loc[df['Tweet'].str.contains("staged", case=False)]

doubters = [fake, real, staged]
slaptruthers = pd.concat(doubters)

slaptruthers['Tweet'].count()
```

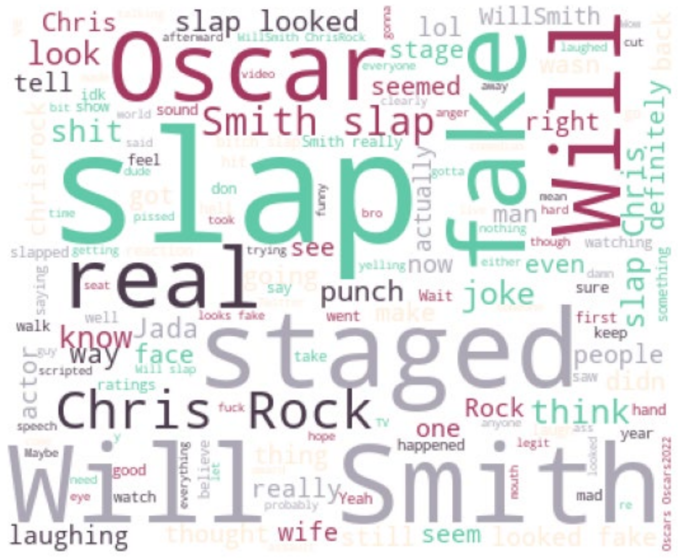
Out[10]:
```
928
```

In [11]:
```python
len(slaptruthers) / len(df) * 100
```

Out[11]:
```
6.859339197279918
```

At least 6.8% of people Tweeting in the moment expressed skepticism about whether the slap was real or a bit for the show!

In [12]:
```
# Creating a simple Wordcloud from the "slaptruthers" dataframe, with custom colors

colors =["#ada8b6", "#ffeedb",
         "#4c3b4d", "#a53860", "#61c9a8"]

cmap = matplotlib.colors.ListedColormap(colors)
stop_words = ["https", "co", "tco", "s", "m", "t", "amp"] + list(STOPWORDS)
wordcloud = WordCloud(stopwords = stop_words, width=400,height=330, colormap=cmap, max_words=150,background_color="whit
ers['Tweet']))

plt.figure(figsize=(10,8))
plt.imshow(wordcloud)
plt.axis('off')
plt.savefig("staged.jpg")
plt.show()
```



Can We Learn Anything Interesting from the Most-Used Hashtags?

In [13]:
```
# Extracting the top 10 most-used hashtags

df['Tweet'].str.extractall(r'(\#\w+)').value_counts().nlargest(10)
```

Out[13]:
```
#Oscars           3010
#WillSmith         537
#Oscars2022        395
#oscars            258
#ChrisRock         198
#chrisrock         192
#slap              151
#Oscar             147
#willsmith         125
#AcademyAwards      69
dtype: int64
```

Hmm, Not Much Unexpected There. What About the Top Mentions?

In [15]:
```
# Extracting the top 10 most-used @ mentions

df['Tweet'].str.extractall(r'(\@\w+)').value_counts().nlargest(10)
```

Out[15]:
```
@chrisrock          229
@willsmith          148
@davidmackau         45
@barstoolsports      42
@stephenasmith       41
@Variety             40
@bubbaprog           36
@stoolpresidente     31
@ClayTravis          26
@TheAcademy          25
dtype: int64
```

Wait ... "@davidmackau"? Who's That?

In [16]:
```
# Looking at Tweets mentioning this person

df.loc[df['Tweet'].str.contains("@davidmackau", case=False, na=False)].head()
```

Out[16]:

	Time	Tweet	Source	ID	Name	Username	Location	Verified?	Bio
350	2022-03-27 20:16:09-07:00	@wrldgrlbmp @davidmackau No, violence is viole...	Twitter for iPhone	1508281762677370885	Grandmasagainsttrump	grandmaresist	California, USA	False	Vietnam Veteran. Between Dem and Progressive. ...
518	2022-03-27 20:16:54-07:00	@davidmackau @LanceZierlein Yeah bro, I aint j...	Twitter for iPhone	1508281953778384906	NativeTexan	peaklover16	NaN	False	NaN
645	2022-03-27 20:17:14-07:00	@DanRichards_PA @davidmackau Omg �� will assaul...	Twitter for iPhone	1508282033973473294	Lisa long	Lisalon32319664	NaN	False	I love reading, music, movies, walking my dog ...
646	2022-03-27 20:17:14-07:00	@davidmackau @__BigO__ Ik one thing, I'd be qu...	Twitter for iPhone	1508282033675644932	����������������������������������	NelliSky_	Cockeysville, MD	False	������������ ���� ������я������������� �� �������� �� �������� ��я����������� ��²....
661	2022-03-27 20:17:12-07:00	@davidmackau Open hand slap not a punch. Man d...	Twitter Web App	1508282028382425094	Catnip�� Creek	CatnipCreek	Kansas City, MO area	False	Retired Univ Faculty & Researcher. �� Owned by...

I looked up that Tweet using its unique Tweet ID (https://twitter.com/grandmaresist/status/1508281762677370885) and I could see the Tweet they're commenting on. Below, I will embed it:

In [2]:
```
# Embedding the Tweet in Jupyter

class Tweet(object):
    def __init__(self, embed=None):
        self.embed = embed

    def _repr_html_(self):
        return self.embed

s = ("""
<blockquote class="twitter-tweet"><p lang="en" dir="ltr">UNCENSORED WILL SMITH FOOTAGE AS SHOWN ON AUSTRALIAN TV <a hre
idgets.js" charset="utf-8"></script>
""")

Tweet(s)
```

Out[2]:

[source for the code above to embed Tweets]

Ah, okay, this explains it. Australian TV (among other foreign outlets) broadcast the moment uncensored, and Australian journalist David Mack was one of the first notable accounts to post footage to Twitter.

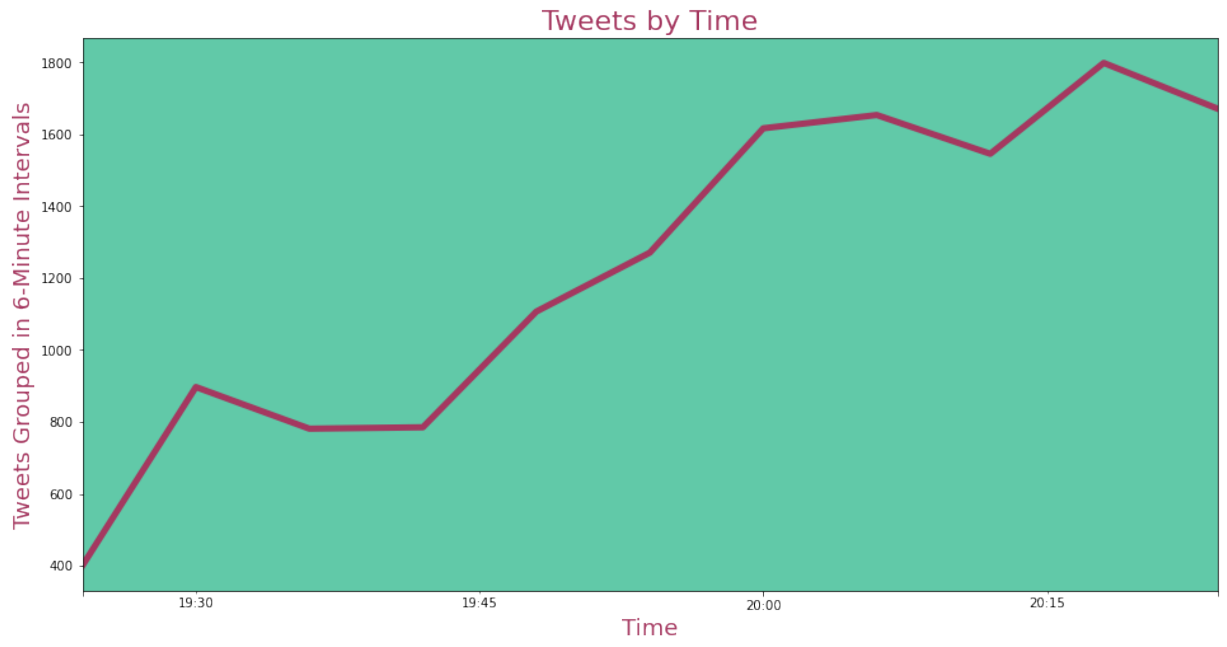
How Were the Tweets Spread Out?

In [18]:
```
# Grouping in 6-minute intervals

df_tweetsbytime = df.groupby(pd.Grouper(key='Time',  freq='6Min')).size()
df_tweetsbytime
```

Out[18]:
```
Time
2022-03-27 19:24:00-07:00     400
2022-03-27 19:30:00-07:00     897
2022-03-27 19:36:00-07:00     781
2022-03-27 19:42:00-07:00     785
2022-03-27 19:48:00-07:00    1107
2022-03-27 19:54:00-07:00    1271
2022-03-27 20:00:00-07:00    1617
2022-03-27 20:06:00-07:00    1654
2022-03-27 20:12:00-07:00    1546
2022-03-27 20:18:00-07:00    1799
2022-03-27 20:24:00-07:00    1672
Freq: 6T, dtype: int64
```

In [19]:
```
# Creating a time series plot

ax = plt.axes()
ax.set_facecolor("#61c9a8")
df_tweetsbytime.plot(color='#a53860',linewidth=5, figsize=(16,8) )
```

```
plt.xlabel('Time', size=18, color="#a53860")
plt.ylabel('Tweets Grouped in 6-Minute Intervals', size=18, color="#a53860")
plt.title('Tweets by Time', size=22, color='#a53860', loc='center')
plt.savefig("time.jpg")
plt.show;
```



source for the code above to group Tweets by time and plot results

Let's Dig Into Our Users a Bit More ...

What was the most-often used hashtag in user bios?

In [20]:
```
# Searching users' bios for hashtags and sorting

df['Bio'].str.extractall(r'(\#\w+)').value_counts().nlargest(10)
```

Out[20]:
```
#BLM                  81
#BlackLivesMatter     80
#1                    54
#LakeShow             22
#Bitcoin              17
#FlyEaglesFly         16
#blacklivesmatter     16
#LGBTQIA              16
#CancelStudentDebt    16
#Resist               15
dtype: int64
```

And the top mentions?

In [21]:
```
# Searching users' bios for @ mentions and sorting

df['Bio'].str.extractall(r'(\@\w+)').value_counts().nlargest(10)
```

Out[21]:
```
@gmail          199
@yahoo           12
@Twitch          10
@BTS_twt          8
```

```
@Variety          7
@Forbes           6
@iHeartRadio      6
@Marvel           5
@ABC              5
@kmbc             5
dtype: int64
```

How many verified users were Tweeting in the moment?

In [22]:
```
# Searching for verified users and calculating the percentage out of our entire dataframe

bluechecks = df['Verified?'] == True
len(df[bluechecks]) / len(df) * 100
```

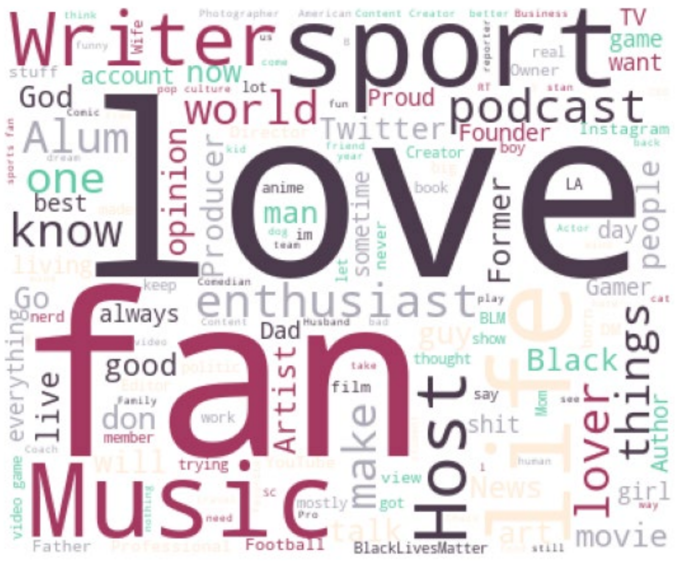
Out[22]:
```
3.5331510089437503
```

At least 3.53% of people Tweeting about the slap were verified users.

How do our users describe themselves in their bios?

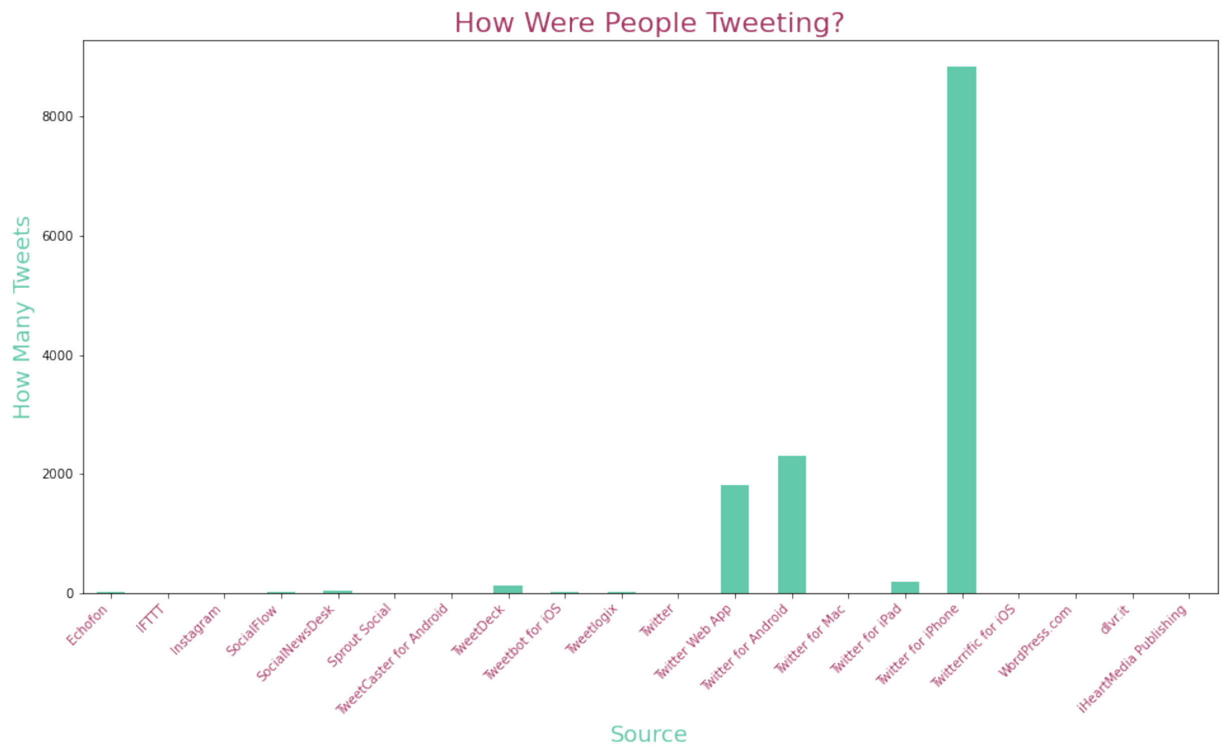
In [23]:
```
# Making sure I'm eliminating users who left their bios blank

bios_notnull = df.loc[df['Bio'].notnull(), :]
```

In [24]:
```
# Creating a Wordcloud from users' bios with custom colors

colors =["#ada8b6", "#ffeedb",
         "#4c3b4d", "#a53860", "#61c9a8"]

cmap = matplotlib.colors.ListedColormap(colors)
stop_words = ["https", "co", "tco", "t", "s", "m", "thing", "IG", "tweet", "tweets", "time", "new", "gmail", "follow",
)
wordcloud = WordCloud(stopwords = stop_words, width=400,height=330, colormap=cmap, max_words=150,background_color="whit
tnull['Bio']))

plt.figure(figsize=(10,8))
plt.imshow(wordcloud)
plt.axis('off')
plt.savefig("bios.jpg")
plt.show()
```



How Were People Tweeting?

```
In [25]: # Creating a simple bar graph with custom colors based on Twitter's Source field

         plt.figure(figsize=(16,8))
         df['Source'].value_counts().nlargest(20).sort_index().plot(kind='bar', color="#61c9a8", figsize=(16,8));
         plt.xlabel('Source', size=18, color="#61c9a8")
         plt.ylabel('How Many Tweets', size=18, color="#61c9a8")
         plt.title('How Were People Tweeting?', size=22, color='#a53860', loc='center')
         plt.xticks(rotation=45, ha="right", color='#a53860')
         plt.savefig("source.jpg");
```



Looks like Twitter for iPhone is the winner!

Did Some People Post More Than Once?

In [26]:
```
# Searching for duplcates of the Username field

power_users = df[df.duplicated(['Username'])]
power_users['Username'].value_counts().head(10)
```

Out[26]:
```
gizzle_my          14
scheel_lala        14
MediaWatchOz        6
LRgarciajr          5
DavidNSch           5
mint_everything     5
AlexScarpelli1      4
ShelettaIsFunny     3
thelibrarybird      3
Sonof_Mosta         3
Name: Username, dtype: int64
```

What Can We Do With Twitter's Location Data?

Let's review U.S. Census data to find the top 10 U.S. cities by population:

- New York City, New York
- Los Angeles, California
- Chicago, Illinois
- Houston, Texas
- Phoenix, Arizona
- Philadelphia, Pennsylvania
- San Antonio, Texas

- San Diego, California
- Dallas, Texas
- San Jose, California

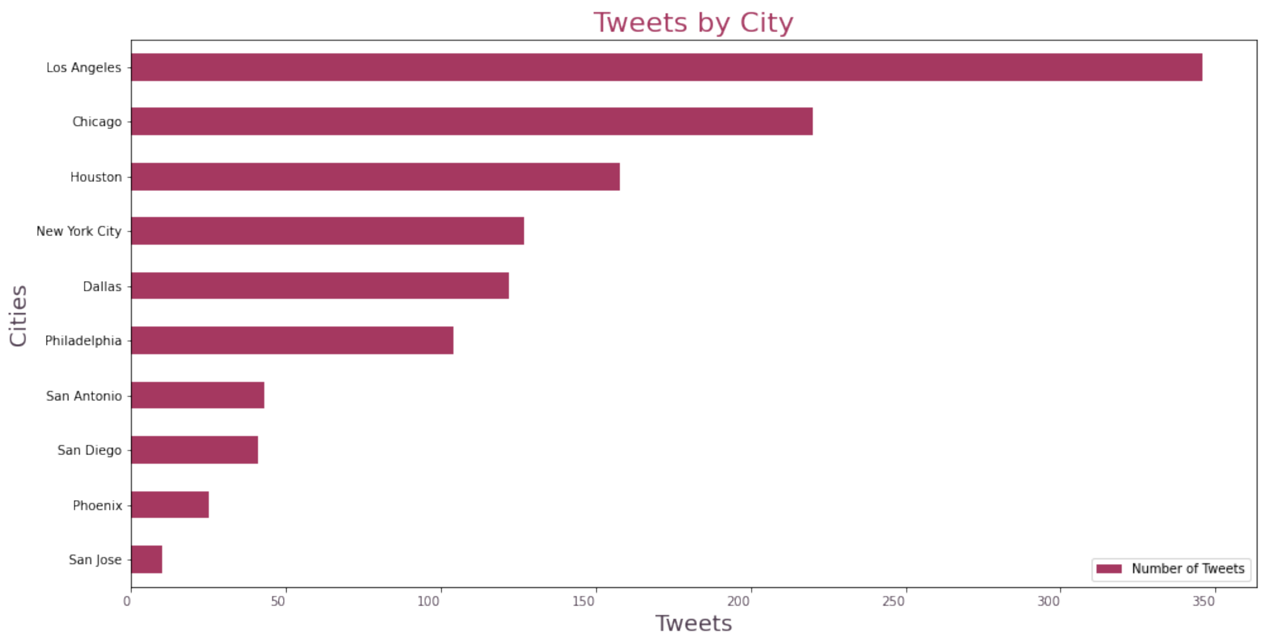
We'll look at those cities in our dataframe. Will we see our Tweets from these cities correspond to their population status? Bear in mind that many people don't fill out their Location data on Twitter, or they may do it in a way outside of convention ("L.A." instead of "Los Angeles" for example), so this will just be a sampling of data.

In [27]:
```
# Searching Twitter location data for corresponding terms

la = df.loc[df['Location'].str.contains("Los angeles", case=False, na=False)]
nyc = df.loc[df['Location'].str.contains("new york city", case=False, na=False)]
nyc2 = df.loc[df['Location'].str.contains("nyc", case=False, na=False)]
chicago = df.loc[df['Location'].str.contains("chicago", case=False, na=False)]
houston = df.loc[df['Location'].str.contains("Houston", case=False, na=False)]
phoenix = df.loc[df['Location'].str.contains("Phoenix", case=False, na=False)]
philadelphia1 = df.loc[df['Location'].str.contains("Philadelphia", case=False, na=False)]
philadelphia2 = df.loc[df['Location'].str.contains("Philly", case=False, na=False)]
sanantonio = df.loc[df['Location'].str.contains("San Antonio", case=False, na=False)]
sandiego = df.loc[df['Location'].str.contains("San Diego", case=False, na=False)]
dallas = df.loc[df['Location'].str.contains("dallas", case=False, na=False)]
sanjose = df.loc[df['Location'].str.contains("San Jose", case=False, na=False)]
```

In [28]:
```
# Cleaning up New York City and Philadelphia

nycdata = [nyc, nyc2]
newyorkcity = pd.concat(nycdata)

phillydata = [philadelphia1, philadelphia2]
philadelphia = pd.concat(phillydata)
```

By running "la['Tweet'].count()," "newyorkcity['Tweet'].count()", etc., I was able to pull the cities' Tweet counts.

In [29]:
```
# Creating a simple horizontal bar graph below based on the city/Tweet count data

tweet_city = pd.DataFrame({'Cities': ['San Jose', 'Phoenix', 'San Diego', 'San Antonio',
                                      'Philadelphia', 'Dallas', 'New York City', 'Houston', 'Chicago', 'Los Angeles'],
                           'Number of Tweets': [10, 25, 41, 43, 104, 122, 127, 158, 220, 346]})

tweet_city.plot.barh(x='Cities', y='Number of Tweets', color='#a53860',figsize=(16,8) )
plt.xlabel('Tweets', size=18, color="#4c3b4d")
plt.ylabel('Cities', size=18, color="#4c3b4d")
plt.title('Tweets by City', size=22, color='#a53860', loc='center')
plt.xticks(ha="right", color='#4c3b4d');
```



Probably not too surprising that Los Angeles tops the list! Interesting that New York wasn't higher and Dallas seems overrepresented.

Conclusions ...

You can see how the breadth of information available from even a handful of Twitter fields, combined with Python's data analysis capabilities, make for a powerful combo for many purposes, like academic research, political research, a small non-profit, or a business or brand to learn about their customers of competitors, just to name a few.