Data Wrangling Project - Twitter Account WeRateDogs

In this project I will wrangle and analyze the tweet archive of Twitter user **@dog_rates**, also known as **WeRateDogs**. WeRateDogs is a Twitter account that rates people's dogs with a humorous comment about the dog. These ratings almost always have a denominator of 10. WeRateDogs asks people to send photos of their dogs which are rated on a scale of one to ten, but are invariably given ratings in excess of the maximum, such as "13/10".

Gather

Gather 3 pieces of data:

- The WeRateDogs Twitter archive: twitter_archive_enhanced.csv
- The tweet image predictions, i.e., what breed of dog (or other object, animal, etc.) is present in each tweet according to a neural network. This file (image_predictions.tsv) is hosted on Udacity's servers and should be downloaded programmatically using the Requests library and the following URL: https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions/image-predictions.tsv (https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions/image-predictions.tsv)
- Queried the Twitter API for each tweet's JSON data using Python's Tweepy library and stored each tweet's entire set of JSON data in a file called tweet_json.txt file.

In [0]:

```
#import libraries
import pandas as pd
import requests
import tweepy
import json
import re
from datetime import datetime
import time
from collections import Counter
import matplotlib.pyplot as plt
%matplotlib inline
```

In [0]:

```
# Code to read csv file into colaboratory:
!pip install -U -q PyDrive
from pydrive.auth import GoogleAuth
from pydrive.drive import GoogleDrive
from google.colab import auth
from oauth2client.client import GoogleCredentials
```

In [0]:

```
auth.authenticate_user()
gauth = GoogleAuth()
gauth.credentials = GoogleCredentials.get_application_default()
drive = GoogleDrive(gauth)
```

In [0]:

```
#2.1 Get the file
downloaded = drive.CreateFile({'id':'1U28pD0Q93m7tBOSkcOX5nA8WTBgiLd16'}) # replace the
id with id of file you want to access
downloaded.GetContentFile('twitter-archive-enhanced.csv')
```

In [0]:

```
#read the twitter archive file
twitter = pd.read_csv('twitter-archive-enhanced.csv')
```

In [0]:

```
#import the tweet image predictions using requests library
url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predicti
ons/image-predictions.tsv'
response = requests.get(url)

with open('image-predictions.tsv', mode = 'wb') as file:
    file.write(response.content)

#read the image predictions file
images = pd.read_csv('image-predictions.tsv', sep = '\t')
```

In [0]:

```
#access Twitter API
consumer_key = 'nUEeHOOUee42DaNHa7l3EX1wv'
consumer_secret = 'Y232RMHyf1YCsjPLZV0LmdHrD0942AjyPHcIibYUwrtzBORkFs'
access_token = '988144052439838722-qv8g4xTxhB1LcytyAk94oUukgcPjmJ3'
access_secret = 'iXC8lzHUHjj5mx2EDIRHnFYEPlsLbzpjozbzASS73RpBc'

auth = tweepy.OAuthHandler(consumer_key, consumer_secret)
auth.set_access_token(access_token, access_secret)

api = tweepy.API(auth, wait_on_rate_limit = True, wait_on_rate_limit_notify = True)
```

In [0]:

```
#add tweets to tweet_json.txt
with open('tweet_json.txt', 'a', encoding='utf8') as f:
    for tweet_id in twitter['tweet_id']:
        try:
            tweet = api.get_status(tweet_id, tweet_mode='extended')
            json.dump(tweet._json, f)
            f.write('\n')
        except:
            continue
```

```
Rate limit reached. Sleeping for: 760
Rate limit reached. Sleeping for: 760
```

In [0]:

```python
#append the tweets to a list
tweets_data = []

tweet_file = open('tweet_json.txt', "r")

for line in tweet_file:
    try:
        tweet = json.loads(line)
        tweets_data.append(tweet)
    except:
        continue

tweet_file.close()
```

In [0]:

```python
#create the json_tweets data frame
json_tweets = pd.DataFrame()
```

In [0]:

```python
#add the necessary columns to the data frame
json_tweets['id'] = list(map(lambda tweet: tweet['id'], tweets_data))
json_tweets['retweet_count'] = list(map(lambda tweet: tweet['retweet_count'], tweets_da
ta))
json_tweets['favorite_count'] = list(map(lambda tweet: tweet['favorite_count'], tweets_
data))
```

Assess

After gathering each of the above pieces of data, I assessed them visually and programmatically for quality and tidiness issues.

In [0]:

```
#display the the twitter archive
twitter
```

Out[0]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56 +0000	href="http://tw
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	href="http://tw
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	href="http://tw
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	href="http://tw
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	href="http://tw
...	...	...	...	...	
2351	666049248165822465	NaN	NaN	2015-11-16 00:24:50 +0000	href="http://tw
2352	666044226329800704	NaN	NaN	2015-11-16 00:04:52 +0000	href="http://tw
2353	666033412701032449	NaN	NaN	2015-11-15 23:21:54 +0000	href="http://tw
2354	666029285002620928	NaN	NaN	2015-11-15 23:05:30 +0000	href="http://tw
2355	666020888022790149	NaN	NaN	2015-11-15 22:32:08 +0000	href="http://tw

2356 rows × 17 columns

In [0]:

```
#display the images predictions data frame
images
```

Out[0]:

	tweet_id	jpg_url	img_num	
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	(
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	1	Rho
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	n
...	...	...	...	
2070	891327558926688256	https://pbs.twimg.com/media/DF6hr6BUMAAzZgT.jpg	2	
2071	891689557279858688	https://pbs.twimg.com/media/DF_q7IAWsAEuuN8.jpg	1	
2072	891815181378084864	https://pbs.twimg.com/media/DGBdLU1WsAANxJ9.jpg	1	
2073	892177421306343426	https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg	1	
2074	892420643555336193	https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg	1	

2075 rows × 12 columns

In [0]:

```
#display the json tweets data frame
json_tweets
```

Out[0]:

	id	retweet_count	favorite_count
0	892420643555336193	7725	36297
1	892177421306343426	5718	31301
2	891815181378084864	3786	23568
3	891689557279858688	7888	39595
4	891327558926688256	8506	37811
...	...	...	...
5531	666049248165822465	39	96
5532	666044226329800704	132	272
5533	666033412701032449	41	112
5534	666029285002620928	42	121
5535	666020888022790149	462	2418

5536 rows × 3 columns

In [0]:

```
#display info of twitter archive
twitter.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2356 entries, 0 to 2355
Data columns (total 17 columns):
 #   Column                      Non-Null Count  Dtype  
---  ------                      --------------  -----  
 0   tweet_id                    2356 non-null   int64  
 1   in_reply_to_status_id       78 non-null     float64
 2   in_reply_to_user_id         78 non-null     float64
 3   timestamp                   2356 non-null   object 
 4   source                      2356 non-null   object 
 5   text                        2356 non-null   object 
 6   retweeted_status_id         181 non-null    float64
 7   retweeted_status_user_id    181 non-null    float64
 8   retweeted_status_timestamp  181 non-null    object 
 9   expanded_urls               2297 non-null   object 
 10  rating_numerator            2356 non-null   int64  
 11  rating_denominator          2356 non-null   int64  
 12  name                        2356 non-null   object 
 13  doggo                       2356 non-null   object 
 14  floofer                     2356 non-null   object 
 15  pupper                      2356 non-null   object 
 16  puppo                       2356 non-null   object 
dtypes: float64(4), int64(3), object(10)
memory usage: 313.0+ KB
```

In [0]:

```
#display statistics for twitter archive
twitter.describe()
```

Out[0]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	retweeted_status_id	retweete
count	2.356000e+03	7.800000e+01	7.800000e+01	1.810000e+02	
mean	7.427716e+17	7.455079e+17	2.014171e+16	7.720400e+17	
std	6.856705e+16	7.582492e+16	1.252797e+17	6.236928e+16	
min	6.660209e+17	6.658147e+17	1.185634e+07	6.661041e+17	
25%	6.783989e+17	6.757419e+17	3.086374e+08	7.186315e+17	
50%	7.196279e+17	7.038708e+17	4.196984e+09	7.804657e+17	
75%	7.993373e+17	8.257804e+17	4.196984e+09	8.203146e+17	
max	8.924206e+17	8.862664e+17	8.405479e+17	8.874740e+17	

In [0]:

```
#display info for images predictions
images.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2075 entries, 0 to 2074
Data columns (total 12 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   tweet_id  2075 non-null   int64  
 1   jpg_url   2075 non-null   object 
 2   img_num   2075 non-null   int64  
 3   p1        2075 non-null   object 
 4   p1_conf   2075 non-null   float64
 5   p1_dog    2075 non-null   bool   
 6   p2        2075 non-null   object 
 7   p2_conf   2075 non-null   float64
 8   p2_dog    2075 non-null   bool   
 9   p3        2075 non-null   object 
 10  p3_conf   2075 non-null   float64
 11  p3_dog    2075 non-null   bool   
dtypes: bool(3), float64(3), int64(2), object(4)
memory usage: 152.1+ KB
```

In [0]:

```
#display statistics for images predictions
images.describe()
```

Out[0]:

	tweet_id	img_num	p1_conf	p2_conf	p3_conf
count	2.075000e+03	2075.000000	2075.000000	2.075000e+03	2.075000e+03
mean	7.384514e+17	1.203855	0.594548	1.345886e-01	6.032417e-02
std	6.785203e+16	0.561875	0.271174	1.006657e-01	5.090593e-02
min	6.660209e+17	1.000000	0.044333	1.011300e-08	1.740170e-10
25%	6.764835e+17	1.000000	0.364412	5.388625e-02	1.622240e-02
50%	7.119988e+17	1.000000	0.588230	1.181810e-01	4.944380e-02
75%	7.932034e+17	1.000000	0.843855	1.955655e-01	9.180755e-02
max	8.924206e+17	4.000000	1.000000	4.880140e-01	2.734190e-01

In [0]:

```
#display info for json tweets
json_tweets.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5536 entries, 0 to 5535
Data columns (total 3 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   id              5536 non-null   int64
 1   retweet_count   5536 non-null   int64
 2   favorite_count  5536 non-null   int64
dtypes: int64(3)
memory usage: 129.9 KB
```

In [0]:

```
#display statistics for json_tweets
json_tweets.describe()
```

Out[0]:

	id	retweet_count	favorite_count
count	5.536000e+03	5536.000000	5536.000000
mean	7.542594e+17	3035.130238	8577.076048
std	7.033537e+16	4775.473052	12470.139306
min	6.660209e+17	1.000000	0.000000
25%	6.829238e+17	624.000000	1395.000000
50%	7.501095e+17	1609.000000	3886.000000
75%	8.159907e+17	3563.000000	11221.000000
max	8.924206e+17	78064.000000	156653.000000

In [0]:

```
#check the number of sources in twitter archive
twitter.source.value_counts()
```

Out[0]:

```
<a href="http://twitter.com/download/iphone" rel="nofollow">Twitter for iP
hone</a>     2221
<a href="http://vine.co" rel="nofollow">Vine - Make a Scene</a>
91
<a href="http://twitter.com" rel="nofollow">Twitter Web Client</a>
33
<a href="https://about.twitter.com/products/tweetdeck" rel="nofollow">Twee
tDeck</a>      11
Name: source, dtype: int64
```

In [0]:

```
#check if there are any duplicate tweet ids in twitter archive
sum(twitter.tweet_id.duplicated())
```

Out[0]:

```
0
```

In [0]:

```
#check names in twitter archive
twitter.name.value_counts()
```

Out[0]:

```
None        745
a            55
Charlie      12
Lucy         11
Oliver       11
           ...
life          1
Timofy        1
Iggy          1
Anna          1
Kendall       1
Name: name, Length: 957, dtype: int64
```

In [0]:

```
#sort names
twitter.name.sort_values()
```

Out[0]:

```
1035      Abby
1021      Abby
938        Ace
1933      Acro
1327     Adele
         ...
1031      very
773       very
1097      very
819       very
1385      very
Name: name, Length: 2356, dtype: object
```

In [0]:

```
#check the number of images
images.img_num.value_counts()
```

Out[0]:

```
1    1780
2     198
3      66
4      31
Name: img_num, dtype: int64
```

In [0]:

```
#check if there are any duplicates tweet_ids in images dataframe
sum(images.tweet_id.duplicated())
```

Out[0]:

```
0
```

In [0]:

```
#check duplicates ids in json tweets
sum(json_tweets.id.duplicated())
```

Out[0]:

```
3205
```

Quality

`twitter` data frame

- Text lines contain links
- timestamp column is a string
- Missing dog names (replaced with 'None')
- Incorrect dog names
- Rating denominator higher than 10
- Retweets present in the file: texts start with "RT @"
- "&amp" characters present in text

`images` data frame

- Some breed names have the first letter lowercase in p1, p2, p3 columns

Tidiness

- Irrelevant columns in `twitter` data frame: "in_reply_to_status_id", "in_reply_to_user_id", "source", "retweeted_status_id", "retweeted_status_user_id", "retweeted_status_timestamp"
- Column name timestamp to be renamed in `twitter` data frame
- Column name "expanded_url" not explicit enough in `twitter` data frame
- Dog stages split into 4 different columns in `twitter` dataframe
- "id" column name from `json_tweets` data frame not aligned with the rest of data frames
- 3 separate data frames

Clean

Cleaned each of the issues I documented while assessing.

In [0]:

```
#create copies of the 3 data frames
twitter_clean = twitter.copy()
images_clean = images.copy()
json_clean = json_tweets.copy()
```

Quality

`twitter` : **Text lines contain links**

Define

Remove the links contained in the text lines.

Code

In [0]:

```
#create a regex pattern in order to define the URLs that are present in the text column
pattern = r"http\S+"
```

In [0]:

```
#write a for loop to remove all URLs from line texts
clean_text = []

for line in twitter_clean['text']:
    clean_text.append(re.sub(pattern, "", line))

twitter_clean['text'] = clean_text
```

Test

In [0]:

```
#check the new variable text ans select a random row
twitter_clean['text'][1445]
```

Out[0]:

```
'Oh my god 10/10 for every little hot dog pupper'
```

`twitter` : **timestamp column is a string**

Define

Convert timestamp column from string to date.

Code

In [0]:

```
#create a for loop to convert each string timestamp to a date
dates = []

for date in twitter_clean['timestamp']:
    dates.append(datetime.strptime(date, "%Y-%m-%d %H:%M:%S +0000").date())


twitter_clean['timestamp'] = dates
```

Test

In [0]:

```
#check column timestamp
twitter_clean['timestamp'].sample(4)
```

Out[0]:

```
1858    2015-12-12
1087    2016-06-01
2294    2015-11-19
199     2017-04-17
Name: timestamp, dtype: object
```

`twitter` : **Missing dog names (replaced with 'None')**

Define

Remove the lines that have the name of the dog "None".

Code

In [0]:

```
#count the number of lines that have the name of the dog "None"
sum(twitter_clean.name == "None")
```

Out[0]:

```
745
```

In [0]:

```
#remove these lines
twitter_clean = twitter_clean[twitter_clean.name != "None"]
```

Test

In [0]:

```
#check if there are any "None" names left
sum(twitter_clean.name == "None")
```

Out[0]:

```
0
```

`twitter` : **Incorrect dog names**

Define

Remove the lines that have incorrect dog names.

Code

In [0]:

```
#find the lower case names in twitter clean and confirm they are not real names
lower = []

for word in twitter_clean['name']:
    if word.islower():
        lower.append(word)

Counter(lower)
```

Out[0]:

```
Counter({'a': 55,
         'actually': 2,
         'all': 1,
         'an': 7,
         'by': 1,
         'getting': 2,
         'his': 1,
         'incredibly': 1,
         'infuriating': 1,
         'just': 4,
         'life': 1,
         'light': 1,
         'mad': 2,
         'my': 1,
         'not': 2,
         'officially': 1,
         'old': 1,
         'one': 4,
         'quite': 4,
         'space': 1,
         'such': 1,
         'the': 8,
         'this': 1,
         'unacceptable': 1,
         'very': 5})
```

In [0]:

```
#create a df only with the first letter in names that is uppercase
twitter_clean = twitter_clean[twitter_clean.name.map(lambda word: word.istitle())]
```

Test

In [0]:

```
#check if there are any lowercase letter names left
lower2 = []

for word in twitter_clean['name']:
    if word.islower():
        lower2.append(word)

Counter(lower2)
```

Out[0]:

```
Counter()
```

`twitter` : **Rating denominator higher than 10**

Define

Remove the lines that have a denominator higher than 10.

Code

In [0]:

```
#chech the value counts of the rating denominator
twitter_clean['rating_denominator'].value_counts()
```

Out[0]:

```
10    1493
50       1
11       1
7        1
Name: rating_denominator, dtype: int64
```

In [0]:

```
#see the lines
twitter_clean[twitter_clean.rating_denominator > 10]
```

Out[0]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	
1202	716439118184652801	NaN	NaN	2016-04-03	href="http://tv
1662	682962037429899265	NaN	NaN	2016-01-01	href="http://tv

In [0]:

```
#create df with rating denominators lower than 10
twitter_clean = twitter_clean[twitter_clean.rating_denominator <=  10]
```

In [0]:

```
```

Test

In [0]:

```
#confirm changes
twitter_clean[twitter_clean.rating_denominator > 10]
```

Out[0]:

tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_sta

`twitter` : **Retweets present in the file: texts start with "RT @"**

Define

Remove the text retweets starting with "RT @", as we are looking only for original tweets.

Code

In [0]:

```
#remove lines containing &amp
twitter_clean = twitter_clean[~twitter_clean['text'].str.contains("&amp")]
```

Test

In [0]:

```
#confirm changes
twitter_clean[twitter_clean['text'].str.contains("&amp")]
```

Out[0]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_sta

`images` : **Some breed names have the first letter lowercase in p1, p2, p3 columns**

Define

Remove the characters "&amp" from text.

code

In [0]:

```
#check the df
images_clean.head()
```

Out[0]:

	tweet_id	jpg_url	img_num	
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh_spr
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	Germ
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	1	Rhodesi
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	minia

In [0]:

```
#capitalize first letter for dog breeds
images_clean['p1'] = images_clean.p1.str.title()
images_clean['p2'] = images_clean.p2.str.title()
images_clean['p3'] = images_clean.p3.str.title()
```

Test

In [0]:

```
images_clean.head()
```

Out[0]:

	tweet_id	jpg_url	img_num	
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh_Sp
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	Gern
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	1	Rhodesi
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	Minia

Tidiness

Irrelevant columns in `twitter` data frame: "in_reply_to_status_id", "in_reply_to_user_id", "source", "retweeted_status_id", "retweeted_status_user_id", "retweeted_status_timestamp"

In [0]:

```
#check the columns
twitter_clean.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1452 entries, 0 to 2325
Data columns (total 17 columns):
 #   Column                      Non-Null Count  Dtype  
---  ------                      --------------  -----  
 0   tweet_id                    1452 non-null   int64  
 1   in_reply_to_status_id       1 non-null      float64
 2   in_reply_to_user_id         1 non-null      float64
 3   timestamp                   1452 non-null   object 
 4   source                      1452 non-null   object 
 5   text                        1452 non-null   object 
 6   retweeted_status_id         109 non-null    float64
 7   retweeted_status_user_id    109 non-null    float64
 8   retweeted_status_timestamp  109 non-null    object 
 9   expanded_urls               1452 non-null   object 
 10  rating_numerator            1452 non-null   int64  
 11  rating_denominator          1452 non-null   int64  
 12  name                        1452 non-null   object 
 13  doggo                       1452 non-null   object 
 14  floofer                     1452 non-null   object 
 15  pupper                      1452 non-null   object 
 16  puppo                       1452 non-null   object 
dtypes: float64(4), int64(3), object(10)
memory usage: 204.2+ KB
```

In [0]:

```
#drop the columns
twitter_clean = twitter_clean.drop(['in_reply_to_status_id', 'in_reply_to_user_id', 'so
urce', 'retweeted_status_id', 'retweeted_status_user_id', 'retweeted_status_timestamp']
, axis=1)
```

Test

In [0]:

```
#check the columns
twitter_clean.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1452 entries, 0 to 2325
Data columns (total 11 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   tweet_id            1452 non-null   int64 
 1   timestamp           1452 non-null   object
 2   text                1452 non-null   object
 3   expanded_urls       1452 non-null   object
 4   rating_numerator    1452 non-null   int64 
 5   rating_denominator  1452 non-null   int64 
 6   name                1452 non-null   object
 7   doggo               1452 non-null   object
 8   floofer             1452 non-null   object
 9   pupper              1452 non-null   object
 10  puppo               1452 non-null   object
dtypes: int64(3), object(8)
memory usage: 136.1+ KB
```

In [0]:

```
twitter_clean.to_csv('twitter_clean.csv')
```

Column name timestamp to be renamed in `twitter` data frame

Define

Rename the timestamp column into date column.

Code

In [0]:

```
#rename the column
twitter_clean = twitter_clean.rename(columns = {'timestamp':'date'})
```

Test

In [0]:

```
#check names of columns
twitter_clean.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1452 entries, 0 to 2325
Data columns (total 11 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   tweet_id            1452 non-null   int64 
 1   date                1452 non-null   object
 2   text                1452 non-null   object
 3   expanded_urls       1452 non-null   object
 4   rating_numerator    1452 non-null   int64 
 5   rating_denominator  1452 non-null   int64 
 6   name                1452 non-null   object
 7   doggo               1452 non-null   object
 8   floofer             1452 non-null   object
 9   pupper              1452 non-null   object
 10  puppo               1452 non-null   object
dtypes: int64(3), object(8)
memory usage: 136.1+ KB
```

Column name "expanded_urls" not explicit enough in `twitter` data frame

Define

Change the name of the 'expanded_urls' column into 'img_url'.

Code

In [0]:

```
#rename the column
twitter_clean = twitter_clean.rename(columns = {'expanded_urls':'img_url'})
```

Test

In [0]:

```
#check the new columns
twitter_clean.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1452 entries, 0 to 2325
Data columns (total 11 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   tweet_id            1452 non-null   int64 
 1   date                1452 non-null   object
 2   text                1452 non-null   object
 3   img_url             1452 non-null   object
 4   rating_numerator    1452 non-null   int64 
 5   rating_denominator  1452 non-null   int64 
 6   name                1452 non-null   object
 7   doggo               1452 non-null   object
 8   floofer             1452 non-null   object
 9   pupper              1452 non-null   object
 10  puppo               1452 non-null   object
dtypes: int64(3), object(8)
memory usage: 136.1+ KB
```

Dog stages split into 4 different columns in `twitter` dataframe

Define

Create a single variable with dog stages.

Code

In [0]:

```
#melt the columns with dog stages
twitter_clean = pd.melt(twitter_clean, id_vars = ['tweet_id', 'date', 'text', 'img_url'
, 'rating_numerator', 'rating_denominator', 'name'], var_name = 'dog', value_name = 'do
g_stage')
```

In [0]:

```
twitter_clean.head(1)
```

Out[0]:

	tweet_id	date	text	img_url	rating_nu
0	892420643555336193	2017-08-01	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	

In [0]:

```
#drop the value column
twitter_clean = twitter_clean.drop('dog', axis = 1)
```

Test

In [0]:

```
#check the new df
twitter_clean.head(100)
```

Out[0]:

	tweet_id	date	text	img_url	rati
0	892420643555336193	2017-08-01	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	
1	892177421306343426	2017-08-01	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	
2	891815181378084864	2017-07-31	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/891815181...	
3	891689557279858688	2017-07-30	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/891689557...	
4	891327558926688256	2017-07-29	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/891327558...	
...	...	...	...	...	
95	866816280283807744	2017-05-23	RT @dog_rates: This is Jamesy. He gives a kiss...	https://twitter.com/dog_rates/status/866450705...	
96	866686824827068416	2017-05-22	This is Lili. She can't believe you betrayed h...	https://twitter.com/dog_rates/status/866686824...	
97	866450705531457537	2017-05-22	This is Jamesy. He gives a kiss to every other...	https://twitter.com/dog_rates/status/866450705...	
98	866334964761202691	2017-05-21	This is Coco. At first I thought she was a clo...	https://twitter.com/dog_rates/status/866334964...	
99	865718153858494464	2017-05-19	Meet Boomer. He's just checking pup on you. Ho...	https://twitter.com/dog_rates/status/865718153...	

100 rows × 8 columns

"id" column name from `json_tweets` data frame not aligned with the rest of data frames

Define

Change the column name "id" into "tweet_id" in json_tweets data frame.

Code

```
In [0]:
```

```
#rename the id column into tweet_id
json_clean = json_clean.rename(columns = {'id':'tweet_id'})
```

Test

```
In [0]:
```

```
#confirm changes
json_clean.head(2)
```

```
Out[0]:
```

	tweet_id	retweet_count	favorite_count
0	892420643555336193	7725	36297
1	892177421306343426	5718	31301

3 separate data frames

Define

Merge all 3 data frames by tweet_id.

Code

```
In [0]:
```

```
#merge all 3 data frames by tweet id
twitter_images = pd.merge(twitter_clean, images_clean, on = 'tweet_id', how='left')
twitter_master = pd.merge(twitter_images, json_clean, on = 'tweet_id', how='left')
```

Test

In [0]:

```
#confirm changes
twitter_master.head(1)
```

Out[0]:

	tweet_id	date	text	img_url	rating_nu
0	892420643555336193	2017-08-01	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	

In [0]:

```
#store file
twitter_master.to_csv('twitter_archive_master.csv')
```

Analysis & Visualization

Check Dataset

In [0]:

```
#view the first lines in twitter master dataset
twitter_master.head()
```

Out[0]:

	tweet_id	date	text	img_url	rating_nı
0	892420643555336193	2017-08-01	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	
1	892420643555336193	2017-08-01	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	
2	892177421306343426	2017-08-01	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	
3	892177421306343426	2017-08-01	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	
4	892177421306343426	2017-08-01	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	

In [0]:

```
#check info
twitter_master.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 14048 entries, 0 to 14047
Data columns (total 21 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   tweet_id            14048 non-null  int64  
 1   date                14048 non-null  object 
 2   text                14048 non-null  object 
 3   img_url             14048 non-null  object 
 4   rating_numerator    14048 non-null  int64  
 5   rating_denominator  14048 non-null  int64  
 6   name                14048 non-null  object 
 7   dog_stage           14048 non-null  object 
 8   jpg_url             12984 non-null  object 
 9   img_num             12984 non-null  float64
 10  p1                  12984 non-null  object 
 11  p1_conf             12984 non-null  float64
 12  p1_dog              12984 non-null  object 
 13  p2                  12984 non-null  object 
 14  p2_conf             12984 non-null  float64
 15  p2_dog              12984 non-null  object 
 16  p3                  12984 non-null  object 
 17  p3_conf             12984 non-null  float64
 18  p3_dog              12984 non-null  object 
 19  retweet_count       13988 non-null  float64
 20  favorite_count      13988 non-null  float64
dtypes: float64(6), int64(3), object(12)
memory usage: 2.4+ MB
```

In [0]:

```
#check if there are any duplicates
sum(twitter_master.duplicated())
```

Out[0]:

```
11848
```

In [0]:

```
#drop duplicates
twitter_master = twitter_master.drop_duplicates()
```

In [0]:

```
#confirm duplicates removed
sum(twitter_master.duplicated())
```

Out[0]:

```
0
```

In [0]:

```
#check info
twitter_master.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2200 entries, 0 to 12636
Data columns (total 21 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   tweet_id            2200 non-null   int64  
 1   date                2200 non-null   object 
 2   text                2200 non-null   object 
 3   img_url             2200 non-null   object 
 4   rating_numerator    2200 non-null   int64  
 5   rating_denominator  2200 non-null   int64  
 6   name                2200 non-null   object 
 7   dog_stage           2200 non-null   object 
 8   jpg_url             2049 non-null   object 
 9   img_num             2049 non-null   float64
 10  p1                  2049 non-null   object 
 11  p1_conf             2049 non-null   float64
 12  p1_dog              2049 non-null   object 
 13  p2                  2049 non-null   object 
 14  p2_conf             2049 non-null   float64
 15  p2_dog              2049 non-null   object 
 16  p3                  2049 non-null   object 
 17  p3_conf             2049 non-null   float64
 18  p3_dog              2049 non-null   object 
 19  retweet_count       2182 non-null   float64
 20  favorite_count      2182 non-null   float64
dtypes: float64(6), int64(3), object(12)
memory usage: 378.1+ KB
```

In [0]:

```
#columns that have missing values
twitter_master.columns[twitter_master.isnull().any()]
```

Out[0]:

```
Index(['jpg_url', 'img_num', 'p1', 'p1_conf', 'p1_dog', 'p2', 'p2_conf',
       'p2_dog', 'p3', 'p3_conf', 'p3_dog', 'retweet_count', 'favorite_cou
nt'],
      dtype='object')
```

In [0]:

```
#drop rows with missing values
twitter_master = twitter_master.dropna()
```

```
In [0]:
```

```
#check info
twitter_master.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2036 entries, 0 to 12636
Data columns (total 21 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   tweet_id            2036 non-null   int64  
 1   date                2036 non-null   object 
 2   text                2036 non-null   object 
 3   img_url             2036 non-null   object 
 4   rating_numerator    2036 non-null   int64  
 5   rating_denominator  2036 non-null   int64  
 6   name                2036 non-null   object 
 7   dog_stage           2036 non-null   object 
 8   jpg_url             2036 non-null   object 
 9   img_num             2036 non-null   float64
 10  p1                  2036 non-null   object 
 11  p1_conf             2036 non-null   float64
 12  p1_dog              2036 non-null   object 
 13  p2                  2036 non-null   object 
 14  p2_conf             2036 non-null   float64
 15  p2_dog              2036 non-null   object 
 16  p3                  2036 non-null   object 
 17  p3_conf             2036 non-null   float64
 18  p3_dog              2036 non-null   object 
 19  retweet_count       2036 non-null   float64
 20  favorite_count      2036 non-null   float64
dtypes: float64(6), int64(3), object(12)
memory usage: 349.9+ KB
```

In the above assessment I have found the following:

```
    - No. of observations in the dataset: 2786
    - No. of columns in the dataset: 21
    - 7867 duplicate rows removed
    - Rows with missing values removed
```

Descriptive Statistics

In [0]:

```
#descriptive statistics
twitter_master.describe()
```

Out[0]:

	tweet_id	rating_numerator	rating_denominator	img_num	p1_conf	p2
count	2.036000e+03	2036.000000	2036.0	2036.00000	2036.000000	2.03600
mean	7.582843e+17	12.756876	10.0	1.24558	0.616720	1.34639
std	7.027404e+16	55.373659	0.0	0.62117	0.267978	1.03538
min	6.664188e+17	2.000000	10.0	1.00000	0.044333	1.01130
25%	6.874247e+17	10.000000	10.0	1.00000	0.384125	4.94419
50%	7.511921e+17	11.000000	10.0	1.00000	0.618483	1.16532
75%	8.190052e+17	12.000000	10.0	1.00000	0.871283	1.98660
max	8.924206e+17	1776.000000	10.0	4.00000	1.000000	4.88014

In [0]:

```
#count the number of ratings numerator
twitter_master['rating_numerator'].value_counts()
```

Out[0]:

```
12      532
11      462
10      355
13      315
9       119
8        95
14       48
7        46
6        24
5        16
3        11
4         5
1776      2
75        2
27        2
2         2
Name: rating_numerator, dtype: int64
```

The most common rating numerator is 12/10, followed by 11/10, 10/10 and 13/10. We also have outliers, 1776/10 and 75/10.

In [0]:

```
#plot the count of rating numerators between 2 and 14
plt.hist(twitter_master['rating_numerator'], range = (2, 14));
plt.xlabel('Rating Numerator')
plt.ylabel('Frequency')
plt.title('Ratings Distribution')
```

Our distribution is left skewed and peaks at 12.

In [0]:

```
#count the number of dog stages
twitter_master['dog_stage'].value_counts()
```

The most common dog stage is pupper, which is a small dog, ussualy younger, as presented by the @dog_rates account. We also have many dogs that are not classified.

In [0]:

```
#filter on dog stages by the median of rating numerator
dogs = twitter_master.groupby(['dog_stage'], as_index = False)['rating_numerator'].medi
an()

dogs
```

Out[0]:

	dog_stage	rating_numerator
0	None	11
1	doggo	12
2	floofer	12
3	pupper	11
4	puppo	12

The average rating numerator by dog stage is between 11 and 12.

In [0]:

```
#highest rated dog
twitter_master['rating_numerator'].value_counts()
```

Out[0]:

```
12      532
11      462
10      355
13      315
9       119
8        95
14       48
7        46
6        24
5        16
3        11
4         5
1776      2
75        2
27        2
2         2
Name: rating_numerator, dtype: int64
```

We have an outlier in the ratings numerators: 1776/10. Let's see more details.

In [0]:

```
#check highest rated dog
twitter_master[twitter_master.rating_numerator == 1776]
```

Out[0]:

	tweet_id	date	text	img_url	rating
1979	749981277374128128	2016-07-04	This is Atticus. He's quite simply America af....	https://twitter.com/dog_rates/status/749981277...	
1980	749981277374128128	2016-07-04	This is Atticus. He's quite simply America af....	https://twitter.com/dog_rates/status/749981277...	

The highest rated dog is named Atticus. The number of favorites is 5525 and 5523.

```
In [0]:
```

```
#check the lowest rating numerator
twitter_master[twitter_master.rating_numerator == 2]
```

```
Out[0]:
```

	tweet_id	date	text	img_url	rating
2924	678424312106393600	2015-12-20	This is Crystal. She's a shitty fireman. No se...	https://twitter.com/dog_rates/status/678424312...	
3046	674265582246694913	2015-12-08	This is Henry. He's a shit dog. Short pointy e...	https://twitter.com/dog_rates/status/674265582...	

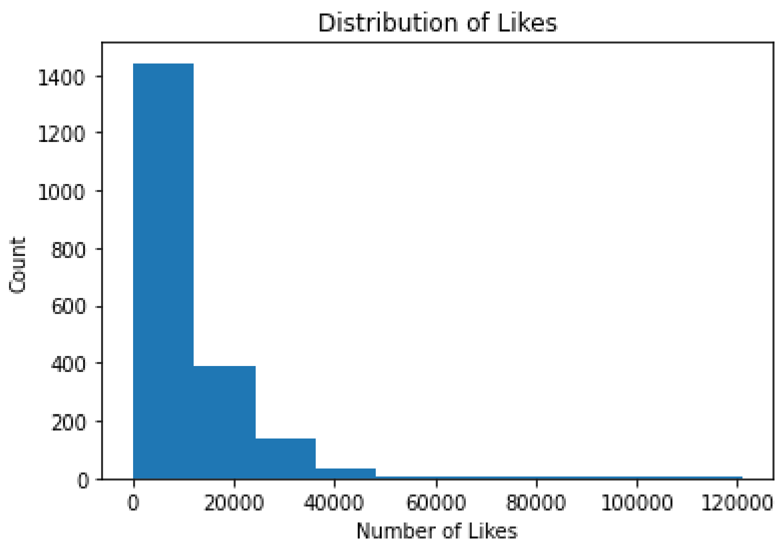
The smallest rating are given to Crystal and Henry.

```
In [0]:
```

```
#create histogram for likes
plt.hist(twitter_master['favorite_count']);
plt.title('Distribution of Likes')
plt.xlabel('Number of Likes')
plt.ylabel('Count')
```

```
Out[0]:
```

```
Text(0, 0.5, 'Count')
```



In [0]:

```
#median number of likes
twitter_master.favorite_count.median()
```

Out[0]:

```
6128.0
```

In [0]:

```
#view the dog that has the highest number of likes
twitter_master[twitter_master.favorite_count == 124644]
```

Out[0]:

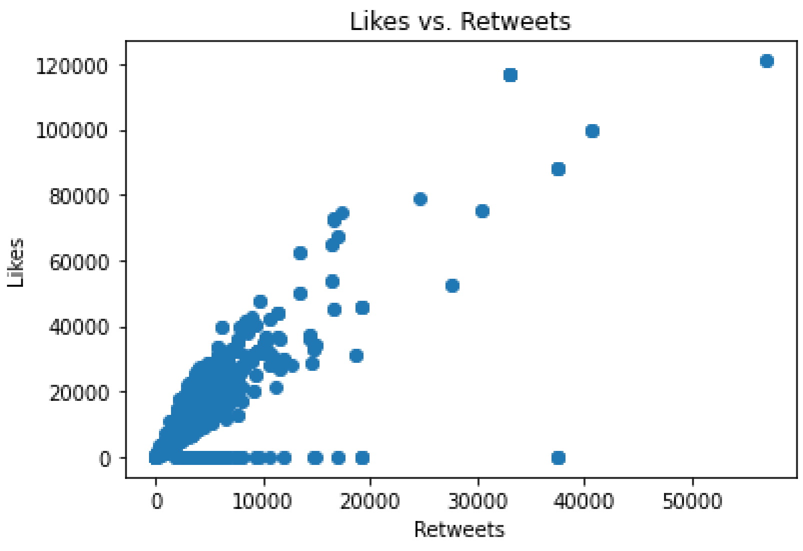
	tweet_id	date	text	img_url	rating_numerator	rating_denominator	name	dog_stage	jpg_

In [0]:

```
#create scatter plot between retweets and favorites
plt.scatter(twitter_master['retweet_count'], twitter_master['favorite_count']);
plt.title('Likes vs. Retweets')
plt.xlabel('Retweets')
plt.ylabel('Likes')
```

Out[0]:

```
Text(0, 0.5, 'Likes')
```



There is a strong positive correlation between retweets and favorites.