Data wrangling WeRateDogs

Table of Contents

In [799]:

```
#Importing libraries
import json
import os
import matplotlib.pyplot as plt
%matplotlib inline
import numpy as np
import pandas as pd
import requests
import seaborn as sns
import tweepy
import time

from datetime import datetime
from functools import reduce
```

Gathering Data

Reference

- https://stackoverflow.com/questions/32400867/pandas-read-csv-from-url (https://stackoverflow.com/questions/32400867/pandas-read-csv-from-url)
- https://developer.twitter.com/en/docs/tweets/data-dictionary/overview/tweet-object3 (https://developer.twitter.com/en/docs/tweets/data-dictionary/overview/tweet-object3)
- https://stackoverflow.com/questions/6159900/correct-way-to-write-line-to-file (https://stackoverflow.com/questions/6159900/correct-way-to-write-line-to-file)
- https://stackoverflow.com/questions/4706499/how-do-you-append-to-a-file (https://stackoverflow.com/questions/4706499/how-do-you-append-to-a-file)
- https://stackoverflow.com/questions/41001973/python-3-5-1-nameerror-name-json-is-not-defined (https://stackoverflow.com/questions/41001973/python-3-5-1-nameerror-name-json-is-not-defined)
- https://stackoverflow.com/questions/27900451/convert-tweepy-status-object-into-json (https://stackoverflow.com/questions/27900451/convert-tweepy-status-object-into-json)
- https://gist.github.com/yanofsky/5436496 (https://gist.github.com/yanofsky/5436496)
- https://stackoverflow.com/questions/11716380/python-beautifulsoup-extract-text-from-anchor-tag (https://stackoverflow.com/questions/11716380/python-beautifulsoup-extract-text-from-anchor-tag)

- https://stackoverflow.com/questions/30522724/take-multiple-lists-into-dataframe (https://stackoverflow.com/questions/30522724/take-multiple-lists-into-dataframe)
- https://stackoverflow.com/questions/15247628/how-to-find-duplicate-names-using-pandas (https://stackoverflow.com/questions/15247628/how-to-find-duplicate-names-using-pandas)
- https://stackoverflow.com/questions/466345/converting-string-into-datetime (https://stackoverflow.com/questions/466345/converting-string-into-datetime)
- https://stackoverflow.com/questions/33034559/how-to-remove-last-the-two-digits-in-a-column-that-is-of-integer-type (https://stackoverflow.com/questions/33034559/how-to-remove-last-the-two-digits-in-a-column-that-is-of-integer-type)
- https://stackoverflow.com/questions/25146121/extracting-just-month-and-year-from-pandas-datetime-column-python (https://stackoverflow.com/questions/25146121/extracting-just-month-and-year-from-pandas-datetime-column-python)
- https://stackoverflow.com/questions/20250771/remap-values-in-pandas-column-with-a-dict (https://stackoverflow.com/questions/20250771/remap-values-in-pandas-column-with-a-dict)
- https://stackoverflow.com/questions/39092067/pandas-dataframe-convert-column-type-to-string-or-categorical (https://stackoverflow.com/questions/39092067/pandas-dataframe-convert-column-type-to-string-or-categorical)
- https://stackoverflow.com/questions/18792918/combine-two-pandas-data-frames-join-on-a-common-column (https://stackoverflow.com/questions/18792918/combine-two-pandas-data-frames-join-on-a-common-column)
- https://stackoverflow.com/questions/45976585/combine-pandas-string-columns-with-missing-values (https://stackoverflow.com/questions/45976585/combine-pandas-string-columns-with-missing-values)

1. Twitter archive file

In [800]:

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

Out[800]:

	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://twitter.c
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	href="http://twitter.c
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	href="http://twitter.c
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	href="http://twitter.c
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	href="http://twitter.c

In [801]:

```
#tw_arc.info()
```

2. Tweet image prediction

In [802]:

```
#Downloading URL programatically
url = "https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions/
r = requests.get(url)

with open('image_predictions.tsv', 'wb') as file:
    file.write(r.content)

#Reading the TSV file
image_pred = pd.read_csv('image_predictions.tsv', sep='\t' )
image_pred.head()
```

Out[802]:

	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 [803]:

```
#image_pred.info()
```

3. Downloading Twitter data through Twitter API

In [ ]:

```
consumer_key = ''
consumer_secret = ''
access_token = ''
access_secret = ''

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

# use jsonparser to make json readable content, create json dumps and query json objects
# wait_on_rate_limit = True , allows the program to wait during timeouts
# wait_on_rate_limit_notify = True, writes to screen when waiting
api = tweepy.API(auth,parser=tweepy.parsers.JSONParser(),wait_on_rate_limit = True, wait_on
```

In [7]:

```
# function to append file line by line
# The function was adapted from https://stackoverflow.com/questions/4706499/how-do-you-appe
# input: the function takes a filename string and text
# process: the function opens a file and adds the text in append mode
def FileSave(filename,content):
    with open(filename, "a") as myfile:
        myfile.write(content)
```

In [8]:

```
# input: the function takes a list of tweet ids and a filename
# process: the function downloads tweets corresponding to a tweet ids and adds it to a file
# out: the function prints out the time taken to download the tweets, prints the error msgs
# returns a list of ids that could not be downloaded

def download_tweets(id_list,filename):

    # set the start time
    start_time = time.time()

    unloaded_tweet_ids=[]
    counter=0
    for i in id_list:
        try:
            #print(counter,' >> Tweet id: ',i)
            tweet=api.get_status(i,tweet_mode='extended')
            FileSave(filename,json.dumps(tweet)+'\n')
            counter=counter+1

        except Exception as download_error_msg:
            print(counter,' >> Tweet id: ',i)
            print(download_error_msg)
            unloaded_tweet_ids.append(i)
            counter=counter+1


    #print unloaded tweeter ids
    print('\n \nTotal number of Tweeter ids :',len(id_list))
    print('The following ',len(unloaded_tweet_ids), 'tweet ids could not be downloaded for
    print(unloaded_tweet_ids)

    # set the end time
    end_time = time.time()

    # print the execution time
    print('\n \nThe download process took: ', (end_time - start_time)/60, ' minutes')

    return(unloaded_tweet_ids)
```

In [ ]:

```
# set the tweet ids that will be using in the api to access the actual data
tweet_id=tw_arc['tweet_id']

# download tweets by passing the tweet_id list and tweet_json.txt filename
# save the results of unloaded ids so they can be attempted again
error_ids_01=download_tweets(tweet_id,'tweet_json.txt')
```

In [ ]:

```
error_ids_02=download_tweets(error_ids_01,'tweet_json.txt')
```

In [804]:

```
#Reading json file to a list array
lines = [line.rstrip('\n') for line in open('tweet_json.txt')]
```

In [805]:

```
#Read one tweet into a temp file zo examine its content
#Load the tweet into a json format for easier extraction of information

tmp = json.loads(lines[0])

#Examine a tweet

tmp
```

Out[805]:


```
{'created_at': 'Tue Aug 01 16:23:56 +0000 2017',
 'id': 892420643555336193,
 'id_str': '892420643555336193',
 'full_text': "This is Phineas. He's a mystical boy. Only ever appears in
the hole of a donut. 13/10 https://t.co/MgUWQ76dJU", (https://t.co/MgUWQ76
dJU",)
 'truncated': False,
 'display_text_range': [0, 85],
 'entities': {'hashtags': [],
  'symbols': [],
  'user_mentions': [],
  'urls': [],
  'media': [{'id': 892420639486877696,
    'id_str': '892420639486877696',
    'indices': [86, 109],
    'media_url': 'http://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'media_url_https': 'https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'url': 'https://t.co/MgUWQ76dJU',
    'display_url': 'pic.twitter.com/MgUWQ76dJU',
    'expanded_url': 'https://twitter.com/dog_rates/status/8924206435553361
93/photo/1',
    'type': 'photo',
    'sizes': {'thumb': {'w': 150, 'h': 150, 'resize': 'crop'},
     'medium': {'w': 540, 'h': 528, 'resize': 'fit'},
     'small': {'w': 540, 'h': 528, 'resize': 'fit'},
     'large': {'w': 540, 'h': 528, 'resize': 'fit'}}}]},
 'extended_entities': {'media': [{'id': 892420639486877696,
    'id_str': '892420639486877696',
    'indices': [86, 109],
    'media_url': 'http://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'media_url_https': 'https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'url': 'https://t.co/MgUWQ76dJU',
    'display_url': 'pic.twitter.com/MgUWQ76dJU',
    'expanded_url': 'https://twitter.com/dog_rates/status/8924206435553361
93/photo/1',
    'type': 'photo',
    'sizes': {'thumb': {'w': 150, 'h': 150, 'resize': 'crop'},
     'medium': {'w': 540, 'h': 528, 'resize': 'fit'},
     'small': {'w': 540, 'h': 528, 'resize': 'fit'},
     'large': {'w': 540, 'h': 528, 'resize': 'fit'}}}]},
 'source': '<a href="http://twitter.com/download/iphone" rel="nofollow">Tw
itter for iPhone</a>',
 'in_reply_to_status_id': None,
 'in_reply_to_status_id_str': None,
 'in_reply_to_user_id': None,
 'in_reply_to_user_id_str': None,
 'in_reply_to_screen_name': None,
```

```
 'user': {'id': 4196983835,
  'id_str': '4196983835',
  'name': 'WeRateDogs®',
  'screen_name': 'dog_rates',
  'location': '⌈ DM YOUR DOGS ⌋',
  'description': 'Your Only Source For Professional Dog Ratings Instagram
 and Facebook ➪ WeRateDogs partnerships@weratedogs.com                ',
  'url': 'https://t.co/Wrvtpnv7JV',
  'entities': {'url': {'urls': [{'url': 'https://t.co/Wrvtpnv7JV',
      'expanded_url': 'https://blacklivesmatters.carrd.co',
      'display_url': 'blacklivesmatters.carrd.co',
      'indices': [0, 23]}]},
   'description': {'urls': []}},
  'protected': False,
  'followers_count': 8778516,
  'friends_count': 16,
  'listed_count': 5598,
  'created_at': 'Sun Nov 15 21:41:29 +0000 2015',
  'favourites_count': 146124,
  'utc_offset': None,
  'time_zone': None,
  'geo_enabled': True,
  'verified': True,
  'statuses_count': 12376,
  'lang': None,
  'contributors_enabled': False,
  'is_translator': False,
  'is_translation_enabled': False,
  'profile_background_color': '000000',
  'profile_background_image_url': 'http://abs.twimg.com/images/themes/them
e1/bg.png',
  'profile_background_image_url_https': 'https://abs.twimg.com/images/them
es/theme1/bg.png',
  'profile_background_tile': False,
  'profile_image_url': 'http://pbs.twimg.com/profile_images/12679725897222
96320/XBr04M6J_normal.jpg',
  'profile_image_url_https': 'https://pbs.twimg.com/profile_images/1267972
589722296320/XBr04M6J_normal.jpg',
  'profile_banner_url': 'https://pbs.twimg.com/profile_banners/4196983835/
1591077312',
  'profile_link_color': 'F5ABB5',
  'profile_sidebar_border_color': '000000',
  'profile_sidebar_fill_color': '000000',
  'profile_text_color': '000000',
  'profile_use_background_image': False,
  'has_extended_profile': False,
  'default_profile': False,
  'default_profile_image': False,
  'following': True,
  'follow_request_sent': False,
  'notifications': False,
  'translator_type': 'none'},
 'geo': None,
 'coordinates': None,
 'place': None,
 'contributors': None,
 'is_quote_status': False,
 'retweet_count': 7678,
 'favorite_count': 36067,
 'favorited': False,
 'retweeted': False,
```

```
 'possibly_sensitive': False,
 'possibly_sensitive_appealable': False,
 'lang': 'en'}
```

In [806]:

```
print (tmp['full_text'])
tmp
```

```
This is Phineas. He's a mystical boy. Only ever appears in the hole of a don
ut. 13/10 https://t.co/MgUWQ76dJU (https://t.co/MgUWQ76dJU)
```

Out[806]:


```
{'created_at': 'Tue Aug 01 16:23:56 +0000 2017',
 'id': 892420643555336193,
 'id_str': '892420643555336193',
 'full_text': "This is Phineas. He's a mystical boy. Only ever appears in th
e hole of a donut. 13/10 https://t.co/MgUWQ76dJU", (https://t.co/MgUWQ76dJ
U",)
 'truncated': False,
 'display_text_range': [0, 85],
 'entities': {'hashtags': [],
  'symbols': [],
  'user_mentions': [],
  'urls': [],
  'media': [{'id': 892420639486877696,
    'id_str': '892420639486877696',
    'indices': [86, 109],
    'media_url': 'http://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'media_url_https': 'https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'url': 'https://t.co/MgUWQ76dJU',
    'display_url': 'pic.twitter.com/MgUWQ76dJU',
    'expanded_url': 'https://twitter.com/dog_rates/status/89242064355533619
3/photo/1',
    'type': 'photo',
    'sizes': {'thumb': {'w': 150, 'h': 150, 'resize': 'crop'},
     'medium': {'w': 540, 'h': 528, 'resize': 'fit'},
     'small': {'w': 540, 'h': 528, 'resize': 'fit'},
     'large': {'w': 540, 'h': 528, 'resize': 'fit'}}}]},
 'extended_entities': {'media': [{'id': 892420639486877696,
    'id_str': '892420639486877696',
    'indices': [86, 109],
    'media_url': 'http://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'media_url_https': 'https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg',
    'url': 'https://t.co/MgUWQ76dJU',
    'display_url': 'pic.twitter.com/MgUWQ76dJU',
    'expanded_url': 'https://twitter.com/dog_rates/status/89242064355533619
3/photo/1',
    'type': 'photo',
    'sizes': {'thumb': {'w': 150, 'h': 150, 'resize': 'crop'},
     'medium': {'w': 540, 'h': 528, 'resize': 'fit'},
     'small': {'w': 540, 'h': 528, 'resize': 'fit'},
     'large': {'w': 540, 'h': 528, 'resize': 'fit'}}}]},
 'source': '<a href="http://twitter.com/download/iphone" rel="nofollow">Twit
ter for iPhone</a>',
 'in_reply_to_status_id': None,
 'in_reply_to_status_id_str': None,
 'in_reply_to_user_id': None,
 'in_reply_to_user_id_str': None,
 'in_reply_to_screen_name': None,
 'user': {'id': 4196983835,
  'id_str': '4196983835',
  'name': 'WeRateDogs®',
  'screen_name': 'dog_rates',
```

```
    'location': '⌜ DM YOUR DOGS ⌟',
    'description': 'Your Only Source For Professional Dog Ratings Instagram an
  d Facebook ➪ WeRateDogs partnerships@weratedogs.com                ',
    'url': 'https://t.co/Wrvtpnv7JV',
    'entities': {'url': {'urls': [{'url': 'https://t.co/Wrvtpnv7JV',
        'expanded_url': 'https://blacklivesmatters.carrd.co',
        'display_url': 'blacklivesmatters.carrd.co',
        'indices': [0, 23]}]},
     'description': {'urls': []}},
    'protected': False,
    'followers_count': 8778516,
    'friends_count': 16,
    'listed_count': 5598,
    'created_at': 'Sun Nov 15 21:41:29 +0000 2015',
    'favourites_count': 146124,
    'utc_offset': None,
    'time_zone': None,
    'geo_enabled': True,
    'verified': True,
    'statuses_count': 12376,
    'lang': None,
    'contributors_enabled': False,
    'is_translator': False,
    'is_translation_enabled': False,
    'profile_background_color': '000000',
    'profile_background_image_url': 'http://abs.twimg.com/images/themes/theme
  1/bg.png',
    'profile_background_image_url_https': 'https://abs.twimg.com/images/theme
  s/theme1/bg.png',
    'profile_background_tile': False,
    'profile_image_url': 'http://pbs.twimg.com/profile_images/1267972589722296
  320/XBr04M6J_normal.jpg',
    'profile_image_url_https': 'https://pbs.twimg.com/profile_images/126797258
  9722296320/XBr04M6J_normal.jpg',
    'profile_banner_url': 'https://pbs.twimg.com/profile_banners/4196983835/15
  91077312',
    'profile_link_color': 'F5ABB5',
    'profile_sidebar_border_color': '000000',
    'profile_sidebar_fill_color': '000000',
    'profile_text_color': '000000',
    'profile_use_background_image': False,
    'has_extended_profile': False,
    'default_profile': False,
    'default_profile_image': False,
    'following': True,
    'follow_request_sent': False,
    'notifications': False,
    'translator_type': 'none'},
   'geo': None,
   'coordinates': None,
   'place': None,
   'contributors': None,
   'is_quote_status': False,
   'retweet_count': 7678,
   'favorite_count': 36067,
   'favorited': False,
   'retweeted': False,
   'possibly_sensitive': False,
   'possibly_sensitive_appealable': False,
   'lang': 'en'}
```

In [807]:

```
#Extract elements from the lines list

#Total number of tweets
no_of_tweets = len(lines)
# len(lines)

# We initialize a set of list for holding infos
tweet_ids = []
tweet_created = []
tweet_full_text = []
tweet_favorite_count = []
tweet_retweet_count= []

for i in range(len(lines)):
    tmp= json.loads(lines[i])
    tweet_ids.append(tmp['id'])
    tweet_created.append(tmp['created_at'])
    tweet_full_text.append(tmp['full_text'])
    tweet_favorite_count.append(tmp['favorite_count'])
    tweet_retweet_count.append(tmp['retweet_count'])

print(i)
```

```
2330
```

In [808]:

```
lists = [tweet_ids, tweet_created, tweet_full_text,tweet_favorite_count,tweet_retweet_count
json_tweets = pd.concat([pd.Series(x) for x in lists], axis=1)
json_tweets.columns = ['tweet_id', 'time_created','full_text','favorite_count','retweet_cou
```

In [809]:

```
json_tweets
```

Out[809]:

	tweet_id	time_created	full_text	favorite_count	retweet_count
0	892420643555336193	Tue Aug 01 16:23:56 +0000 2017	This is Phineas. He's a mystical boy. Only eve...	36067	7678
1	892177421306343426	Tue Aug 01 00:17:27 +0000 2017	This is Tilly. She's just checking pup on you....	31105	5678
2	891815181378084864	Mon Jul 31 00:18:03 +0000 2017	This is Archie. He is a rare Norwegian Pouncin...	23418	3763
3	891689557279858688	Sun Jul 30 15:58:51 +0000 2017	This is Darla. She commenced a snooze mid meal...	39337	7851
4	891327558926688256	Sat Jul 29 16:00:24 +0000 2017	This is Franklin. He would like you to stop ca...	37582	8449
...	...	...	...	...	...
2326	666049248165822465	Mon Nov 16 00:24:50 +0000 2015	Here we have a 1949 1st generation vulpix. Enj...	96	40
2327	666044226329800704	Mon Nov 16 00:04:52 +0000 2015	This is a purebred Piers Morgan. Loves to Netf...	271	131
2328	666033412701032449	Sun Nov 15 23:21:54 +0000 2015	Here is a very happy pup. Big fan of well-main...	112	41
2329	666029285002620928	Sun Nov 15 23:05:30 +0000 2015	This is a western brown Mitsubishi terrier. Up...	121	42
2330	666020888022790149	Sun Nov 15 22:32:08 +0000 2015	Here we have a Japanese Irish Setter. Lost eye...	2404	460

2331 rows × 5 columns

In [810]:

```
json_tweets.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2331 entries, 0 to 2330
Data columns (total 5 columns):
 #   Column          Non-Null Count  Dtype 
---  ------          --------------  ----- 
 0   tweet_id        2331 non-null   int64 
 1   time_created    2331 non-null   object
 2   full_text       2331 non-null   object
 3   favorite_count  2331 non-null   int64 
 4   retweet_count   2331 non-null   int64 
dtypes: int64(3), object(2)
memory usage: 91.2+ KB
```

In [811]:

```
def find_duplicates(df_column):
    names=df_column.value_counts()
    return(names[names>1])
```

Assessing data

Analysing the twitter archive dataset

In [812]:

```
tw_arc.head()
```

Out[812]:

	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://twitter.c
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	href="http://twitter.c
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	href="http://twitter.c
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	href="http://twitter.c
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	href="http://twitter.c

In [813]:

```
tw_arc.columns
```

Out[813]:

```
Index(['tweet_id', 'in_reply_to_status_id', 'in_reply_to_user_id', 'timestam
p',
       'source', 'text', 'retweeted_status_id', 'retweeted_status_user_id',
       'retweeted_status_timestamp', 'expanded_urls', 'rating_numerator',
       'rating_denominator', 'name', 'doggo', 'floofer', 'pupper', 'puppo'],
      dtype='object')
```

In [814]:

```
tw_arc.sample(5)
```

Out[814]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	
1550	689154315265683456	NaN	NaN	2016-01-18 18:36:07 +0000	href="http://twitt
766	777684233540206592	NaN	NaN	2016-09-19 01:42:24 +0000	href="http://twitt
1737	679530280114372609	NaN	NaN	2015-12-23 05:13:38 +0000	href="http://twitt
926	754874841593970688	NaN	NaN	2016-07-18 03:06:01 +0000	href="http://twitt
1721	680130881361686529	NaN	NaN	2015-12-24 21:00:12 +0000	href="http://twitt

In [815]:

```
#checking for false decimal rating for rating_numerator
tw_arc[tw_arc.text.str.contains(r"(\d+\.\d*\/\d+)")][['text', 'rating_numerator']]
```

```
D:\Anaconda 2020\lib\site-packages\pandas\core\strings.py:1952: UserWarning:
This pattern has match groups. To actually get the groups, use str.extract.
  return func(self, *args, **kwargs)
```

Out[815]:

	text	rating_numerator
45	This is Bella. She hopes her smile made you sm...	5
340	RT @dog_rates: This is Logan, the Chow who liv...	75
695	This is Logan, the Chow who lived. He solemnly...	75
763	This is Sophie. She's a Jubilant Bush Pupper. ...	27
1689	I've been told there's a slight possibility he...	5
1712	Here we have uncovered an entire battalion of ...	26

In [816]:

```
#we have to chnage the type from int to float (for rating_numerator and rating_demoninator)
tw_arc[['rating_numerator', 'rating_denominator']] = tw_arc[['rating_numerator','rating_den

#tw_arc.info()

#First change numerator and denominators type int to float to allow decimals
tw_arc[['rating_numerator', 'rating_denominator']] = tw_arc[['rating_numerator','rating_den

#Update numerators manually

tw_arc.loc[(tw_arc.tweet_id == 883482846933004288), 'rating_numerator'] = 13.5
tw_arc.loc[(tw_arc.tweet_id == 786709082849828864), 'rating_numerator'] = 9.75
tw_arc.loc[(tw_arc.tweet_id == 778027034220126208), 'rating_numerator'] = 11.27
tw_arc.loc[(tw_arc.tweet_id == 681340665377193984), 'rating_numerator'] = 9.5
tw_arc.loc[(tw_arc.tweet_id == 680494726643068929), 'rating_numerator'] = 11.26

#TEST
with pd.option_context('max_colwidth', 200):
    display(tw_arc[tw_arc['text'].str.contains(r"(\d+\.\d*\/\d+)")][['tweet_id', 'text', 'r
```

```
D:\Anaconda 2020\lib\site-packages\pandas\core\strings.py:1952: UserWarning:
This pattern has match groups. To actually get the groups, use str.extract.
  return func(self, *args, **kwargs)
```

	tweet_id	text	rating_numerator	rating_denominator
45	883482846933004288	This is Bella. She hopes her smile made you smile. If not, she is also offering you her favorite monkey. 13.5/10 https://t.co/qjrljjt948	13.50	10.0
340	832215909146226688	RT @dog_rates: This is Logan, the Chow who lived. He solemnly swears he's up to lots of good. H*ckin magical af 9.75/10 https://t.co/yBO5wu…	75.00	10.0
695	786709082849828864	This is Logan, the Chow who lived. He solemnly swears he's up to lots of good. H*ckin magical af 9.75/10 https://t.co/yBO5wuqaPS	9.75	10.0
763	778027034220126208	This is Sophie. She's a Jubilant Bush Pupper. Super h*ckin rare. Appears at random just to smile at the locals. 11.27/10 would smile back https://t.co/QFaUiIHxHq	11.27	10.0
1689	681340665377193984	I've been told there's a slight possibility he's checking his mirror. We'll bump to 9.5/10. Still a menace	9.50	10.0
1712	680494726643068929	Here we have uncovered an entire battalion of holiday puppers. Average of 11.26/10 https://t.co/eNm2S6p9BD	11.26	10.0

In [817]:

```
tw_arc.head(50)
```

	NaN	NaN	NaN	https://twitter.com/dog_rates/status/8849
	NaN	NaN	NaN	https://twitter.com/dog_rates/status/8848
	NaN	NaN	NaN	https://twitter.com/dog_rates/status/8845
	NaN	NaN	NaN	https://twitter.com/dog_rates/status/8844

In [818]:

```
find_duplicates(tw_arc.tweet_id)
```

Out[818]:

```
Series([], Name: tweet_id, dtype: int64)
```

In [819]:

```
find_duplicates(tw_arc.text)
```

Out[819]:

```
Series([], Name: text, dtype: int64)
```

In [820]:

```
find_duplicates(tw_arc.source)
```

Out[820]:

```
<a href="http://twitter.com/download/iphone" rel="nofollow">Twitter for iPho
ne</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">TweetD
eck</a>      11
Name: source, dtype: int64
```

In [821]:

```
find_duplicates(tw_arc.expanded_urls)
```

Out[821]:

```
https://twitter.com/dog_rates/status/768193404517830656/photo/1 (https://twi
tter.com/dog_rates/status/768193404517830656/photo/1)
2
https://twitter.com/dog_rates/status/762699858130116608/photo/1 (https://twi
tter.com/dog_rates/status/762699858130116608/photo/1)
2
http://www.gofundme.com/bluethewhitehusky,https://twitter.com/dog_rates/stat
us/831650051525054464/photo/1,https://twitter.com/dog_rates/status/831650051
525054464/photo/1,https://twitter.com/dog_rates/status/831650051525054464/ph
oto/1,https://twitter.com/dog_rates/status/831650051525054464/photo/1 (htt
p://www.gofundme.com/bluethewhitehusky,https://twitter.com/dog_rates/status/
831650051525054464/photo/1,https://twitter.com/dog_rates/status/831650051525
054464/photo/1,https://twitter.com/dog_rates/status/831650051525054464/phot
o/1,https://twitter.com/dog_rates/status/831650051525054464/photo/1)    2
https://twitter.com/dog_rates/status/679462823135686656/photo/1 (https://twi
tter.com/dog_rates/status/679462823135686656/photo/1)
2
https://twitter.com/dog_rates/status/786963064373534720/photo/1 (https://twi
tter.com/dog_rates/status/786963064373534720/photo/1)
2

..
https://vine.co/v/ea0OwvPTx9l (https://vine.co/v/ea0OwvPTx9l)
2
https://twitter.com/dog_rates/status/841077006473256960/photo/1 (https://twi
tter.com/dog_rates/status/841077006473256960/photo/1)
2
https://twitter.com/dog_rates/status/866334964761202691/photo/1,https://twit
ter.com/dog_rates/status/866334964761202691/photo/1 (https://twitter.com/dog
_rates/status/866334964761202691/photo/1,https://twitter.com/dog_rates/statu
s/866334964761202691/photo/1)
2
https://twitter.com/dog_rates/status/771380798096281600/photo/1,https://twit
ter.com/dog_rates/status/771380798096281600/photo/1,https://twitter.com/dog_
rates/status/771380798096281600/photo/1,https://twitter.com/dog_rates/statu
s/771380798096281600/photo/1 (https://twitter.com/dog_rates/status/771380798
096281600/photo/1,https://twitter.com/dog_rates/status/771380798096281600/ph
oto/1,https://twitter.com/dog_rates/status/771380798096281600/photo/1,http
s://twitter.com/dog_rates/status/771380798096281600/photo/1)
2
https://www.gofundme.com/my-puppys-double-cataract-surgery,https://twitter.c
om/dog_rates/status/825026590719483904/photo/1,https://twitter.com/dog_rate
s/status/825026590719483904/photo/1 (https://www.gofundme.com/my-puppys-doub
le-cataract-surgery,https://twitter.com/dog_rates/status/825026590719483904/
photo/1,https://twitter.com/dog_rates/status/825026590719483904/photo/1)
2
Name: expanded_urls, Length: 79, dtype: int64
```

In [822]:

```
find_duplicates(tw_arc.rating_numerator)
```

Out[822]:

```
12.0     558
11.0     464
10.0     461
13.0     351
9.0      158
8.0      102
7.0       55
14.0      54
5.0       35
6.0       32
3.0       19
4.0       17
2.0        9
1.0        9
0.0        2
15.0       2
420.0      2
Name: rating_numerator, dtype: int64
```

In [823]:

```
find_duplicates(tw_arc.rating_denominator)
```

Out[823]:

```
10.0    2333
11.0       3
50.0       3
20.0       2
80.0       2
Name: rating_denominator, dtype: int64
```

In [824]:

```
find_duplicates(tw_arc.name)
```

Out[824]:

```
None        745
a            55
Charlie      12
Cooper       11
Lucy         11
           ...
Rocky         2
Philbert      2
Betty         2
Elliot        2
Curtis        2
Name: name, Length: 295, dtype: int64
```

In [825]:

```
tw_arc.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   float64
 11  rating_denominator          2356 non-null   float64
 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(6), int64(1), object(10)
memory usage: 313.0+ KB
```

Analysing the image_predictions dataset

In [826]:

```
image_pred.head()
```

Out[826]:

	tweet_id	jpg_url	img_num	
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh_spring
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	German
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	1	Rhodesian
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	miniature

In [827]:

```
image_pred.sample(5)
```

Out[827]:

	tweet_id	jpg_url	img_num	
374	672995267319328768	https://pbs.twimg.com/media/CVb1mRiWcAADBsE.jpg	1	French_
1879	846514051647705089	https://pbs.twimg.com/media/C79sB4xXwAEvwKY.jpg	2	golden_r
1230	745712589599014916	https://pbs.twimg.com/media/ClINnkWWMAEDIAR.jpg	1	se
1305	753375668877008896	https://pbs.twimg.com/media/CnSHLFeWgAAwV-I.jpg	1	l
2073	892177421306343426	https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg	1	Chil

In [828]:

```
image_pred.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 [829]:

```
find_duplicates(image_pred.tweet_id)
```

Out[829]:

```
Series([], Name: tweet_id, dtype: int64)
```

In [830]:

```
find_duplicates(image_pred.jpg_url)
```

Out[830]:

```
https://pbs.twimg.com/media/CxqsX-8XUAAEvjD.jpg (https://pbs.twimg.com/medi
a/CxqsX-8XUAAEvjD.jpg)                                                    2
https://pbs.twimg.com/ext_tw_video_thumb/807106774843039744/pu/img/8XZg1xW35
Xp2J6JW.jpg (https://pbs.twimg.com/ext_tw_video_thumb/807106774843039744/pu/
img/8XZg1xW35Xp2J6JW.jpg)    2
https://pbs.twimg.com/media/CsVO7ljW8AAckRD.jpg (https://pbs.twimg.com/medi
a/CsVO7ljW8AAckRD.jpg)                                                    2
https://pbs.twimg.com/media/CZhn-QAWwAASQan.jpg (https://pbs.twimg.com/medi
a/CZhn-QAWwAASQan.jpg)                                                    2
https://pbs.twimg.com/media/CV_cnjHWUAADc-c.jpg (https://pbs.twimg.com/medi
a/CV_cnjHWUAADc-c.jpg)                                                    2

..
https://pbs.twimg.com/media/CVgdFjNWEAAxmbq.jpg (https://pbs.twimg.com/medi
a/CVgdFjNWEAAxmbq.jpg)                                                    2
https://pbs.twimg.com/media/CvaYgDOWgAEfjls.jpg (https://pbs.twimg.com/medi
a/CvaYgDOWgAEfjls.jpg)                                                    2
https://pbs.twimg.com/media/DA7iHL5U0AA1OQo.jpg (https://pbs.twimg.com/medi
a/DA7iHL5U0AA1OQo.jpg)                                                    2
https://pbs.twimg.com/media/CU1zsMSUAAAS0qW.jpg (https://pbs.twimg.com/medi
a/CU1zsMSUAAAS0qW.jpg)                                                    2
https://pbs.twimg.com/media/ChK1tdBWwAQ1flD.jpg (https://pbs.twimg.com/medi
a/ChK1tdBWwAQ1flD.jpg)                                                    2
Name: jpg_url, Length: 66, dtype: int64
```

In [831]:

```
# a function that extracts the first dog breed prediction from the image predictions DataSe
def breed(row):
    if row['p1_dog']:
        return(row['p1'])
    elif row['p2_dog']:
        return(row['p2'])
    elif row['p3_dog']:
        return(row['p3'])
    else:
        return(np.NaN)
```

In [832]:

```
# apply the breed function to the clean DataFrame to create a new column 'breed_pred'
image_pred['breed_pred'] = image_pred.apply (lambda row: breed (row),axis=1)
```

In [833]:

```
image_pred.head()
```

Out[833]:

	tweet_id	jpg_url	img_num	
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh_spring
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	German
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	1	Rhodesian
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	miniature

Analysing the tweet_json dataframe

In [834]:

```
json_tweets.head()
```

Out[834]:

	tweet_id	time_created	full_text	favorite_count	retweet_count
0	892420643555336193	Tue Aug 01 16:23:56 +0000 2017	This is Phineas. He's a mystical boy. Only eve...	36067	7678
1	892177421306343426	Tue Aug 01 00:17:27 +0000 2017	This is Tilly. She's just checking pup on you....	31105	5678
2	891815181378084864	Mon Jul 31 00:18:03 +0000 2017	This is Archie. He is a rare Norwegian Pouncin...	23418	3763
3	891689557279858688	Sun Jul 30 15:58:51 +0000 2017	This is Darla. She commenced a snooze mid meal...	39337	7851
4	891327558926688256	Sat Jul 29 16:00:24 +0000 2017	This is Franklin. He would like you to stop ca...	37582	8449

In [835]:

```
json_tweets.sample(5)
```

Out[835]:

	tweet_id	time_created	full_text	favorite_count	retweet_count
1779	676946864479084545	Wed Dec 16 02:08:04 +0000 2015	This pups goal was to get all four feet as clo...	1694	361
680	786363235746385920	Thu Oct 13 00:29:39 +0000 2016	This is Rizzo. He has many talents. A true ren...	11042	3567
1285	707059547140169728	Tue Mar 08 04:25:07 +0000 2016	Say hello to Cupcake. She's an Icelandic Dippe...	2571	666
1139	723673163800948736	Sat Apr 23 00:41:42 +0000 2016	This is Ivar. She is a badass Viking warrior. ...	2976	877
161	859607811541651456	Wed May 03 03:17:27 +0000 2017	Sorry for the lack of posts today. I came home...	17851	1484

In [836]:

```
json_tweets.describe()
```

Out[836]:

	tweet_id	favorite_count	retweet_count
count	2.331000e+03	2331.000000	2331.000000
mean	7.419079e+17	7531.241956	2694.401973
std	6.823170e+16	11691.006670	4555.604727
min	6.660209e+17	0.000000	1.000000
25%	6.782670e+17	1313.500000	545.500000
50%	7.182469e+17	3273.000000	1262.000000
75%	7.986692e+17	9221.500000	3133.000000
max	8.924206e+17	155569.000000	77506.000000

In [837]:

```
json_tweets.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2331 entries, 0 to 2330
Data columns (total 5 columns):
 #   Column          Non-Null Count  Dtype 
---  ------          --------------  ----- 
 0   tweet_id        2331 non-null   int64 
 1   time_created    2331 non-null   object
 2   full_text       2331 non-null   object
 3   favorite_count  2331 non-null   int64 
 4   retweet_count   2331 non-null   int64 
dtypes: int64(3), object(2)
memory usage: 91.2+ KB
```

In [838]:

```
find_duplicates(json_tweets.tweet_id)
```

Out[838]:

```
Series([], Name: tweet_id, dtype: int64)
```

In [839]:

```
len(json_tweets)
```

Out[839]:

```
2331
```

In [840]:

```
find_duplicates(json_tweets.full_text)
```

Out[840]:

```
Series([], Name: full_text, dtype: int64)
```

Quality Issues

Visual & Programmatically - completness, validity, accuracy, consistency

Twitter_archive Data

- The expanded_url column, has some repeated multiple urls which is separated by a comma
- The name column has non name strings such as None, a, an
- Rating_denominator as high as 80
- The following variables should be integers instead of floats: in_reply_to_status_id,in_reply_to_user_id, retweeted_status_id,retweeted_status_user_id
- Contains retweets
- The anchor text in source column is repeated numerous times

Image_predictions Data

- p1, p2,p3: upper and lower case mixed together
- p1, p2,p3: dash and underscore mixed in string eg. black-and-tan_coonhound
- Missing values when compared to twitter_archive dataframe

Tweet_json Data

- time_created should be a data/time object
- dropping unnecessary columns

Tidiness Issues

In Twitter_archive Data

- Variables called 'doggo', 'floofer', 'pupper', 'puppo' are different growth stages of a pet based on age, merge this in one column.

Merging 3 datasets

- Merge 3 datasets(Twitter_archive Data,Image_predictions Data, Tweet_json Data) into final dataset.

Data Cleaning

(Define) Cleaning the twitter_archive dataframe

1. format the timestamp to datetime format
2. add column for the month, weekday and hour the tweet was created
3. remove retweets
4. convert source to categorical value
5. remove duplicated multiple urls in expanded_urls variable
6. remove non name characters from name variable
7. dropping unnecessary columns
8. change the rating denominator to 10

In [841]:

```
# making a copy of the twitter_archive dataframe
tw_arc_clean=tw_arc.copy()
```

In [842]:

```
#tw_arc
```

In [843]:

```
# 1. format the timestamp to datetime format
tw_arc_clean.timestamp=tw_arc_clean.timestamp.str[:-6]
#tw_arc_clean
tw_arc_clean['timestamp'] =  pd.to_datetime(tw_arc_clean['timestamp'], format='%Y-%m-%d %X'

tw_arc_clean.head()
```

Out[843]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56	href="http://twitter.c
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27	href="http://twitter.c
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03	href="http://twitter.c
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51	href="http://twitter.c
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24	href="http://twitter.c

In [844]:

```
tw_arc_clean.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   datetime64[ns]
 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   float64
 11  rating_denominator          2356 non-null   float64
 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: datetime64[ns](1), float64(6), int64(1), object(9)
memory usage: 313.0+ KB
```

In [845]:

```
# 2. add columns for the month, weekday and hour the tweet was created

tw_arc_clean['timestamp_month']=tw_arc_clean.timestamp.map(lambda a: a.month)
tw_arc_clean['timestamp_weekday']=tw_arc_clean.timestamp.map(lambda a: a.weekday())
tw_arc_clean['timestamp_hour']=tw_arc_clean.timestamp.map(lambda a: a.hour)

#tw_arc_clean.head()
```

In [846]:

```
#tw_arc_clean.retweeted_status_id
```

In [847]:

```
# 3. remove reweets
index_original_tweet = pd.isnull(tw_arc_clean['retweeted_status_id'])
tw_arc_clean = tw_arc_clean[index_original_tweet]

tw_arc_clean.retweeted_status_id.value_counts()
```

Out[847]:

```
Series([], Name: retweeted_status_id, dtype: int64)
```

In [848]:

```
# 4. Convert source to categorical value
tw_arc_clean.source.value_counts()


# create a dictionary for mapping
source = {'<a href="http://twitter.com/download/iphone" rel="nofollow">Twitter for iPhone</
            '<a href="http://vine.co" rel="nofollow">Vine - Make a Scene</a>':'Vine - Make
            '<a href="http://twitter.com" rel="nofollow">Twitter Web Client</a>':'Twitter W
            '<a href="https://about.twitter.com/products/tweetdeck" rel="nofollow">TweetDec

# map the dictionary
tw_arc_clean['source']=tw_arc_clean['source'].replace(source)

print(tw_arc_clean['source'].value_counts())

# convert the source variable to a categorical object
tw_arc_clean['source']=tw_arc_clean['source'].astype('category')

# hows that source variable is now sa category
tw_arc_clean.info()
```

```
Twitter for iPhone     2042
Vine - Make a Scene      91
Twitter Web Client       31
TweetDeck                11
Name: source, dtype: int64
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2175 entries, 0 to 2355
Data columns (total 20 columns):
 #   Column                      Non-Null Count  Dtype
---  ------                      --------------  -----
 0   tweet_id                    2175 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                   2175 non-null   datetime64[ns]
 4   source                      2175 non-null   category
 5   text                        2175 non-null   object
 6   retweeted_status_id         0 non-null      float64
 7   retweeted_status_user_id    0 non-null      float64
 8   retweeted_status_timestamp  0 non-null      object
 9   expanded_urls               2117 non-null   object
 10  rating_numerator            2175 non-null   float64
 11  rating_denominator          2175 non-null   float64
 12  name                        2175 non-null   object
 13  doggo                       2175 non-null   object
 14  floofer                     2175 non-null   object
 15  pupper                      2175 non-null   object
 16  puppo                       2175 non-null   object
 17  timestamp_month             2175 non-null   int64
 18  timestamp_weekday           2175 non-null   int64
 19  timestamp_hour              2175 non-null   int64
dtypes: category(1), datetime64[ns](1), float64(6), int64(4), object(8)
memory usage: 342.2+ KB
```

In [849]:

```
tw_arc_clean.head()
```

Out[849]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	te
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56	Twitter for iPhone	This Phinea He's mysti boy. Or eve
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27	Twitter for iPhone	This is Ti She's ju checki pup you
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03	Twitter for iPhone	This Archie. I is a ra Norwegi Pouncir
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51	Twitter for iPhone	This Darla. S commenc a snoo mid mea
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24	Twitter for iPhone	This Franklin. I would li you to st ca

In [850]:

```
# 5. remove duplicated mutiple urls in expanded_urls variable

tw_arc_clean.expanded_urls.head(10).map(lambda a : print(a))
```

```
https://twitter.com/dog_rates/status/892420643555336193/photo/1 (https://twi
tter.com/dog_rates/status/892420643555336193/photo/1)
https://twitter.com/dog_rates/status/892177421306343426/photo/1 (https://twi
tter.com/dog_rates/status/892177421306343426/photo/1)
https://twitter.com/dog_rates/status/891815181378084864/photo/1 (https://twi
tter.com/dog_rates/status/891815181378084864/photo/1)
https://twitter.com/dog_rates/status/891689557279858688/photo/1 (https://twi
tter.com/dog_rates/status/891689557279858688/photo/1)
https://twitter.com/dog_rates/status/891327558926688256/photo/1,https://twit
ter.com/dog_rates/status/891327558926688256/photo/1 (https://twitter.com/dog
_rates/status/891327558926688256/photo/1,https://twitter.com/dog_rates/statu
s/891327558926688256/photo/1)
https://twitter.com/dog_rates/status/891087950875897856/photo/1 (https://twi
tter.com/dog_rates/status/891087950875897856/photo/1)
https://gofundme.com/ydvmve-surgery-for-jax,https://twitter.com/dog_rates/st
atus/890971913173991426/photo/1 (https://gofundme.com/ydvmve-surgery-for-ja
x,https://twitter.com/dog_rates/status/890971913173991426/photo/1)
https://twitter.com/dog_rates/status/890729181411237888/photo/1,https://twit
ter.com/dog_rates/status/890729181411237888/photo/1 (https://twitter.com/dog
_rates/status/890729181411237888/photo/1,https://twitter.com/dog_rates/statu
s/890729181411237888/photo/1)
https://twitter.com/dog_rates/status/890609185150312448/photo/1 (https://twi
tter.com/dog_rates/status/890609185150312448/photo/1)
https://twitter.com/dog_rates/status/890240255349198849/photo/1 (https://twi
tter.com/dog_rates/status/890240255349198849/photo/1)
```

Out[850]:

```
0    None
1    None
2    None
3    None
4    None
5    None
6    None
7    None
8    None
9    None
Name: expanded_urls, dtype: object
```

In [851]:

```
# 6. remove non name characters from name variable

tw_arc_clean.name.value_counts()
```

Out[851]:

```
None       680
a           55
Charlie     11
Lucy        11
Oliver      10
          ...
Jareld       1
Mojo         1
Rilo         1
Edmund       1
Odin         1
Name: name, Length: 956, dtype: int64
```

In [852]:

```
# tw_arc_clean['name']=tw_arc_clean['name'].replace('None', np.NaN, )
# # Replace 'a' with Nan
# tw_arc_clean['name']=tw_arc_clean['name'].replace('a', np.NaN, )
# # Replace 'an' with Nan
# tw_arc_clean['name']=tw_arc_clean['name'].replace('an', np.NaN, )

tw_arc_clean['name'] = tw_arc_clean['name'].str.replace('^[a-z]+', 'None')

#print(tw_arc_clean['name'].value_counts())
tw_arc_clean['name'].value_counts()

tw_arc_clean['name'].sample(10)
```

Out[852]:

```
1500      Edgar
807        None
1585    Jackson
1109      Terry
2280       Fwed
1813       None
1197     Smokey
1216    Calbert
1681    Jimothy
2133    Winston
Name: name, dtype: object
```

In [853]:

```
# 7. dropping unnecessary columns

drop_columns = ['in_reply_to_status_id', 'in_reply_to_user_id', 'retweeted_status_id',
                'retweeted_status_user_id','retweeted_status_timestamp']

tw_arc_clean= tw_arc_clean.drop(drop_columns, axis=1)


tw_arc_clean
```

Out[853]:

	tweet_id	timestamp	source	text	expa
0	892420643555336193	2017-08-01 16:23:56	Twitter for iPhone	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/89
1	892177421306343426	2017-08-01 00:17:27	Twitter for iPhone	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/89
2	891815181378084864	2017-07-31 00:18:03	Twitter for iPhone	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/89
3	891689557279858688	2017-07-30 15:58:51	Twitter for iPhone	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/89
4	891327558926688256	2017-07-29 16:00:24	Twitter for iPhone	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/89
...	...	...	...	...	
2351	666049248165822465	2015-11-16 00:24:50	Twitter for iPhone	Here we have a 1949 1st generation vulpix. Enj...	https://twitter.com/dog_rates/status/66
2352	666044226329800704	2015-11-16 00:04:52	Twitter for iPhone	This is a purebred Piers Morgan. Loves to Netf...	https://twitter.com/dog_rates/status/66
2353	666033412701032449	2015-11-15 23:21:54	Twitter for iPhone	Here is a very happy pup. Big fan of well-main...	https://twitter.com/dog_rates/status/66

	tweet_id	timestamp	source	text	expa
2354	666029285002620928	2015-11-15 23:05:30	Twitter for iPhone	This is a western brown Mitsubishi terrier. Up...	https://twitter.com/dog_rates/status/66
2355	666020888022790149	2015-11-15 22:32:08	Twitter for iPhone	Here we have a Japanese Irish Setter. Lost eye...	https://twitter.com/dog_rates/status/66

2175 rows × 15 columns

In [854]:

```
# 8. Change the rating denominator to 10

tw_arc_clean.rating_denominator.value_counts()
tw_arc_clean.rating_denominator=10


tw_arc_clean.rating_denominator.value_counts()
```

Out[854]:

```
10    2175
Name: rating_denominator, dtype: int64
```

In [855]:

```
tw_arc_clean.rating_numerator.value_counts()
tw_arc_clean.query("rating_numerator!=10")
```

Out[855]:

	tweet_id	timestamp	source	text	expand
0	892420643555336193	2017-08-01 16:23:56	Twitter for iPhone	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/8924
1	892177421306343426	2017-08-01 00:17:27	Twitter for iPhone	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/8921
2	891815181378084864	2017-07-31 00:18:03	Twitter for iPhone	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/8918
3	891689557279858688	2017-07-30 15:58:51	Twitter for iPhone	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/8916
4	891327558926688256	2017-07-29 16:00:24	Twitter for iPhone	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/8913
...	...	...	...	...	
2351	666049248165822465	2015-11-16 00:24:50	Twitter for iPhone	Here we have a 1949 1st generation vulpix. Enj...	https://twitter.com/dog_rates/status/6660
2352	666044226329800704	2015-11-16 00:04:52	Twitter for iPhone	This is a purebred Piers Morgan. Loves to Netf...	https://twitter.com/dog_rates/status/6660
2353	666033412701032449	2015-11-15 23:21:54	Twitter for iPhone	Here is a very happy pup. Big fan of well-main...	https://twitter.com/dog_rates/status/6660
2354	666029285002620928	2015-11-15 23:05:30	Twitter for iPhone	This is a western brown Mitsubishi terrier. Up...	https://twitter.com/dog_rates/status/6660
2355	666020888022790149	2015-11-15 22:32:08	Twitter for iPhone	Here we have a Japanese Irish Setter. Lost eye...	https://twitter.com/dog_rates/status/6660

1733 rows × 15 columns

In [856]:

```
tw_arc_clean.query("rating_denominator!=10")
```

Out[856]:

	tweet_id	timestamp	source	text	expanded_urls	rating_numerator	rating_denominator	nam

Tidiness Issue

In [857]:

```
# making one column for (doggo, floofer, pupper and  puppo ) in Twitter_archive Data
dog_col = ['doggo', 'floofer', 'pupper', 'puppo']

dog_digtionary = tw_arc_clean[dog_col].replace('None', '')
tw_arc_clean['dog_digtionary'] = dog_digtionary.apply(lambda x: ''.join(x), axis=1).replace

tw_arc_clean.drop(dog_digtionary, axis=1, inplace=True)

tw_arc_clean.head(50)
```

37	885167619883638784	12 16:03:00	for iPhone	corgi undercover as a malamute....	https://twitter.com/dog_rates/status/885167619...	
38	884925521741709313	2017-07-12 00:01:00	Twitter for iPhone	This is Earl. He found a hat. Nervous about wh...	https://twitter.com/dog_rates/status/884925521...	
39	884876753390489601	2017-07-11 20:47:12	Twitter for iPhone	This is Lola. It's her first time outside. Mus...	https://twitter.com/dog_rates/status/884876753...	
40	884562892145688576	2017-07-11 00:00:02	Twitter for iPhone	This is Kevin. He's just so happy. 13/10 what ...	https://twitter.com/dog_rates/status/884562892...	
41	884441805382717440	2017-07-10 15:58:53	Twitter for iPhone	I present to you, Pup in Hat. Pup in Hat is gr...	https://twitter.com/dog_rates/status/884441805...	
42	884247878851493888	2017-07-10 03:08:17	Twitter for iPhone	OMG HE DIDN'T MEAN TO HE WAS JUST TRYING A LIT	https://twitter.com/kaijohnson_19/status/88396...	

Cleaning image_predictions data

In [858]:

```
#making a copy of it
image_pred_clean=image_pred.copy()

#dropping the 'img_num' column
image_pred_clean=image_pred_clean.drop('img_num',axis=1)

image_pred_clean.head()
```

Out[858]:

	tweet_id	jpg_url	p1
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	Welsh_springer_spaniel
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	redbone
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	German_shepherd
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg	Rhodesian_ridgeback
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	miniature_pinscher

Cleaning json tweets data

In [859]:

```
# making a copy of it
json_tweets_clean=json_tweets.copy()

# dropping unnecessary columns
drop_columns=['full_text','time_created']
json_tweets_clean=json_tweets_clean.drop(drop_columns,axis=1)
```

In [860]:

```
find_duplicates(json_tweets.tweet_id)

json_tweets_cleaned = json_tweets_clean.drop_duplicates(keep='first')
json_tweets_cleaned.info
```

Out[860]:

```
<bound method DataFrame.info of                tweet_id  favorite_count  re
tweet_count
0     892420643555336193           36067           7678
1     892177421306343426           31105           5678
2     891815181378084864           23418           3763
3     891689557279858688           39337           7851
4     891327558926688256           37582           8449
...                   ...             ...            ...
2326  666049248165822465              96             40
2327  666044226329800704             271            131
2328  666033412701032449             112             41
2329  666029285002620928             121             42
2330  666020888022790149            2404            460

[2331 rows x 3 columns]>
```

Merging the data sets (Tidiness issue)

In [861]:

```
# Merging cleaned twitter archive data with cleaned image predictions data

merge1=pd.merge(tw_arc_clean,image_pred_clean, on='tweet_id', how='left')
merge1.head()
```

Out[861]:

	tweet_id	timestamp	source	text	expanded_
0	892420643555336193	2017-08-01 16:23:56	Twitter for iPhone	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/8924206
1	892177421306343426	2017-08-01 00:17:27	Twitter for iPhone	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/8921774
2	891815181378084864	2017-07-31 00:18:03	Twitter for iPhone	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/8918151
3	891689557279858688	2017-07-30 15:58:51	Twitter for iPhone	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/8916895
4	891327558926688256	2017-07-29 16:00:24	Twitter for iPhone	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/8913275

5 rows × 23 columns

In [862]:

```
# Merging the merge1 with cleaned json tweets data

final_data=pd.merge(merge1,json_tweets_clean,on='tweet_id', how='left')

final_data.head()
```

Out[862]:

	tweet_id	timestamp	source	text	expanded_
0	892420643555336193	2017-08-01 16:23:56	Twitter for iPhone	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/8924206
1	892177421306343426	2017-08-01 00:17:27	Twitter for iPhone	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/8921774
2	891815181378084864	2017-07-31 00:18:03	Twitter for iPhone	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/8918151
3	891689557279858688	2017-07-30 15:58:51	Twitter for iPhone	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/8916895
4	891327558926688256	2017-07-29 16:00:24	Twitter for iPhone	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/8913275

5 rows × 25 columns

In [863]:

```
final_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2175 entries, 0 to 2174
Data columns (total 25 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   tweet_id            2175 non-null   int64
 1   timestamp           2175 non-null   datetime64[ns]
 2   source              2175 non-null   category
 3   text                2175 non-null   object
 4   expanded_urls       2117 non-null   object
 5   rating_numerator    2175 non-null   float64
 6   rating_denominator  2175 non-null   int64
 7   name                2175 non-null   object
 8   timestamp_month     2175 non-null   int64
 9   timestamp_weekday   2175 non-null   int64
 10  timestamp_hour      2175 non-null   int64
 11  dog_digtionary      344 non-null    object
 12  jpg_url             1994 non-null   object
 13  p1                  1994 non-null   object
 14  p1_conf             1994 non-null   float64
 15  p1_dog              1994 non-null   object
 16  p2                  1994 non-null   object
 17  p2_conf             1994 non-null   float64
 18  p2_dog              1994 non-null   object
 19  p3                  1994 non-null   object
 20  p3_conf             1994 non-null   float64
 21  p3_dog              1994 non-null   object
 22  breed_pred          1686 non-null   object
 23  favorite_count      2168 non-null   float64
 24  retweet_count       2168 non-null   float64
dtypes: category(1), datetime64[ns](1), float64(6), int64(5), object(12)
memory usage: 427.1+ KB
```

In [864]:

```
final_data.to_csv('twitter_archive_master.csv', index=False)
```

In [865]:

```
final = pd.read_csv('twitter_archive_master.csv')
```

In [866]:

```
final.head()
```

Out[866]:

	tweet_id	timestamp	source	text	expanded_
0	892420643555336193	2017-08-01 16:23:56	Twitter for iPhone	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/8924206
1	892177421306343426	2017-08-01 00:17:27	Twitter for iPhone	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/8921774
2	891815181378084864	2017-07-31 00:18:03	Twitter for iPhone	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/8918151
3	891689557279858688	2017-07-30 15:58:51	Twitter for iPhone	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/8916895
4	891327558926688256	2017-07-29 16:00:24	Twitter for iPhone	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/8913275

5 rows × 25 columns

Analysis and Visualization

Reference

- https://pandas.pydata.org/pandas-docs/version/0.23/generated/pandas.DataFrame.plot.bar.html (https://pandas.pydata.org/pandas-docs/version/0.23/generated/pandas.DataFrame.plot.bar.html)
- https://stackoverflow.com/questions/16645799/how-to-create-a-word-cloud-from-a-corpus-in-python (https://stackoverflow.com/questions/16645799/how-to-create-a-word-cloud-from-a-corpus-in-python)
- https://stackoverflow.com/questions/27934885/how-to-hide-code-from-cells-in-ipython-notebook-visualized-with-nbviewer (https://stackoverflow.com/questions/27934885/how-to-hide-code-from-cells-in-ipython-notebook-visualized-with-nbviewer)

Insights

In [867]:

```
#final_data.head()
```

- Is the tweet that received the most favorites count also the tweet that was retweeted most?
- What day of the week were most of the tweets created?
- Which dog breed is most common?

In [868]:

```
#importing necessary libraries
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
from wordcloud import WordCloud, STOPWORDS
sns.set(style="whitegrid", color_codes=True)
from PIL import Image
from io import BytesIO
```

Question 1: Is the tweet that received the most favorites count also the tweet that was retweeted most?

In [869]:

```
Q1=final_data.sort_values(by=['favorite_count','retweet_count'],
                          ascending=False)[['tweet_id','favorite_count','retweet_count']].hea

print('Table of Tweet IDs with the top 10 favorites count and retweets count')

Q1
```

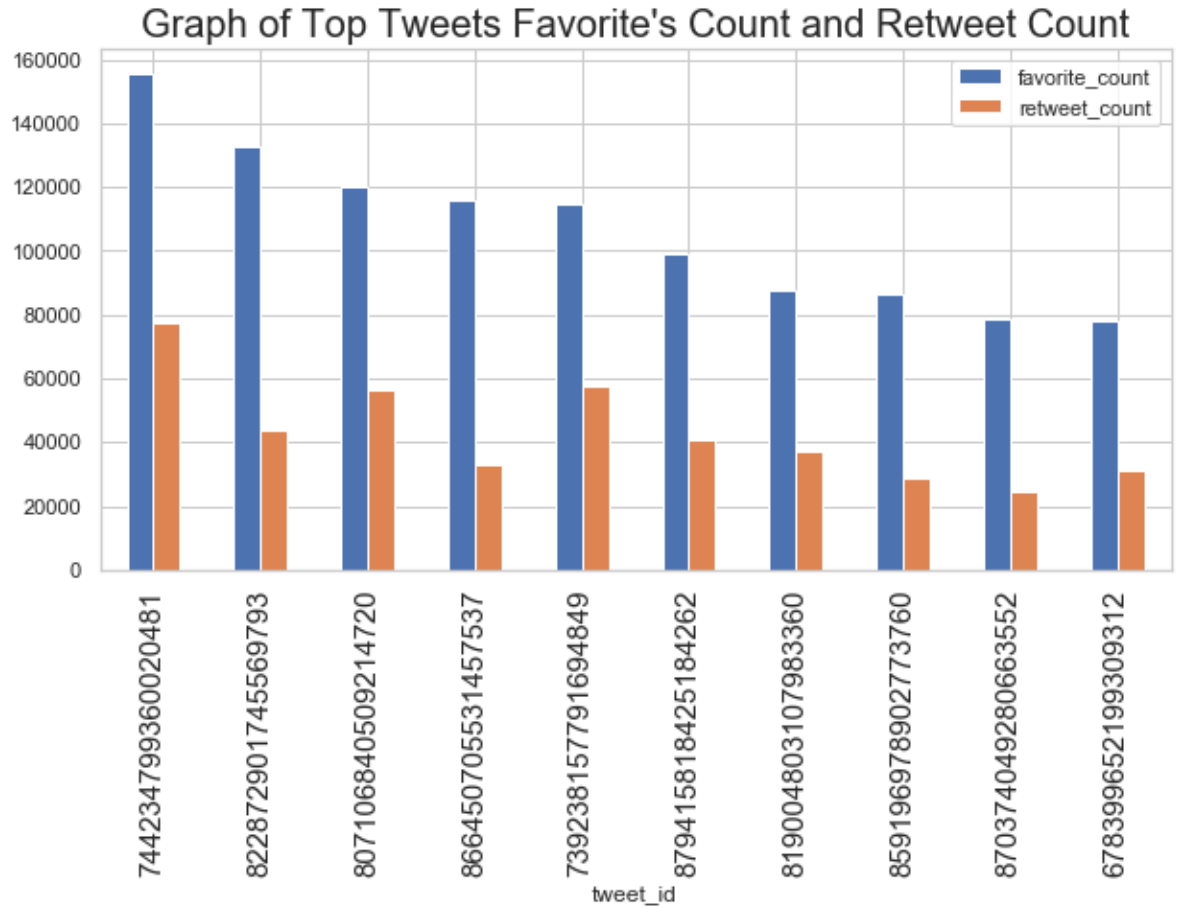
```
Table of Tweet IDs with the top 10 favorites count and retweets count
```

Out[869]:

	tweet_id	favorite_count	retweet_count
862	744234799360020481	155569.0	77506.0
348	822872901745569793	132579.0	43631.0
445	807106840509214720	120129.0	56474.0
119	866450705531457537	116045.0	32824.0
901	739238157791694849	114956.0	57498.0
63	879415818425184262	98905.0	40476.0
374	819004803107983360	87829.0	37291.0
147	859196978902773760	86167.0	28563.0
103	870374049280663552	78329.0	24472.0
1587	678399652199309312	78050.0	31212.0

In [870]:

```
ax=Q1.plot.bar(x='tweet_id',rot=0,subplots=False,figsize=(10,5))
ax.set_xticklabels(ax.get_xticklabels(),rotation=90,fontsize=15)
ax.set_title("Graph of Top Tweets Favorite's Count and Retweet Count", fontsize=20);
```



- From the above plot we see that, the favorite tweets not necessarily has been tweeted most. For example the id 822872901745569793 has a favorite tweet of around 130000 but it retweeted 41000 times.

Question 2: What day of the week were most of the tweets created?

In [871]:

```
Q2=final_data.groupby('timestamp_weekday').size().reset_index(name = "Number of Tweets")

print('Table of number of Tweets by weekday')

Q2
```

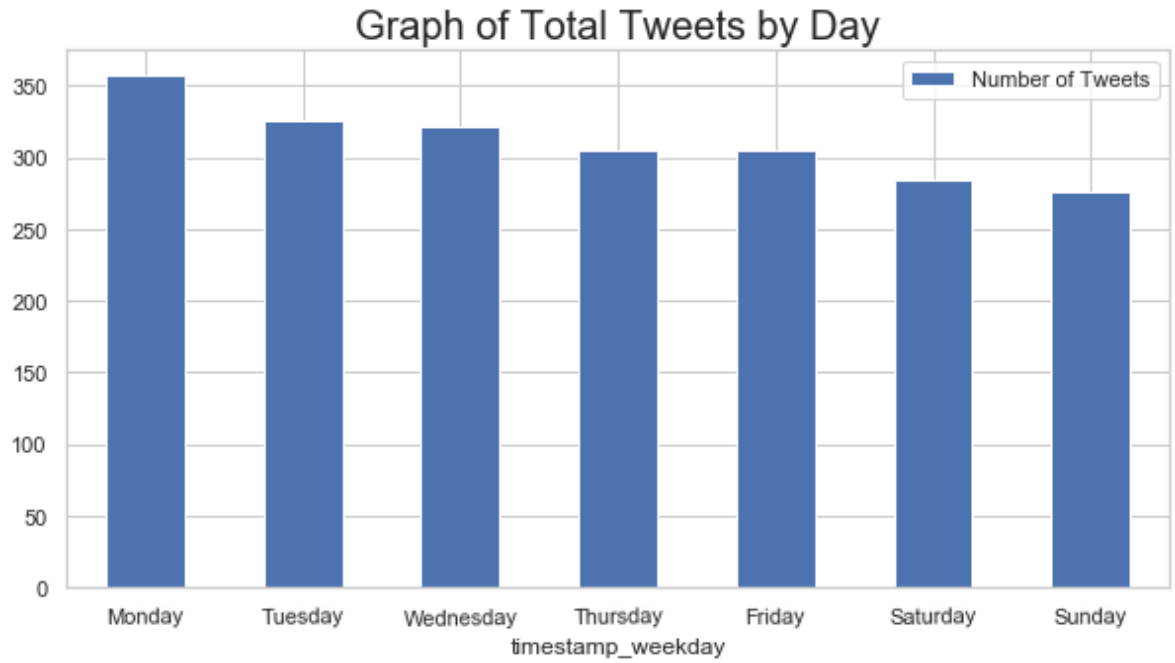
```
Table of number of Tweets by weekday
```

Out[871]:

	timestamp_weekday	Number of Tweets
0	0	357
1	1	326
2	2	322
3	3	305
4	4	305
5	5	284
6	6	276

In [872]:

```
# create a dictionary for mapping
day = {'0':'Monday','1':'Tuesday','2':'Wednesday','3':'Thursday','4':'Friday','5':'Saturday

# map the dictionary
Q2['timestamp_weekday']=Q2['timestamp_weekday'].astype(str).replace(day)

# plotting barplot
ax=Q2.plot.bar(x='timestamp_weekday',rot=1,subplots=False,figsize=(10,5))
ax.set_title("Graph of Total Tweets by Day", fontsize=20);
```



- It's pretty interesting that, the highest number of tweets were created on the first day of the week and the lowest on the weekend.

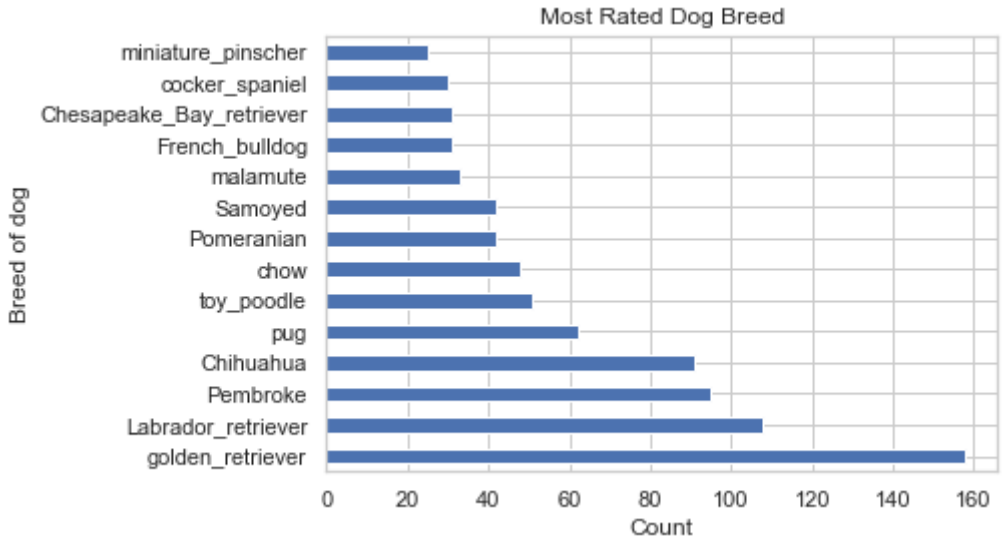
In [873]:

```
# rank the names frequency in a descending order
final_data.name.value_counts().sort_values(ascending =False)[:10].plot(kind ='barh')
plt.title("Most Common Dogs' Names")
plt.xlabel('Frequency')
plt.ylabel("Dog's Name");


final_data.name.value_counts()[0:7].plot(kind = 'barh', figsize=(15,8), title='Most Common D
```

Question 3. Which dog breed is most common ?

In [874]:

```
# Histogram to visualize dog breeeds
dog_breed = final_data.groupby('breed_pred').filter(lambda x: len(x) >= 25)

dog_breed['breed_pred'].value_counts().plot(kind = 'barh')
plt.title('Most Rated Dog Breed')
plt.xlabel('Count')
plt.ylabel('Breed of dog');
```



golden retriever is the most common dog

How do @WeRateDogs accounts write their posts? (DogCloud)

In [875]:

```
text = final_data.text.to_string(index =False).replace('/','').strip()
def wordzcloud(text):

    # choose the mask from a google dog pictures
    url = 'https://thumbs.dreamstime.com/b/german-shepherd-dog-side-view-standing-isolated-
    r = requests.get(url)
    mask = np.array(Image.open(BytesIO(r.content)))

    # set stopwords
    stopwords = ('This','and','is','the','to')#set(STOPWORDS)
    # set other parameters
    wc = WordCloud(background_color= 'white',
                   mask = mask,
                   stopwords=stopwords,
                   max_words=100,
                   contour_color='blue')
    # generate the word cloud
    wc.generate(text)

    return wc.to_image()
```

In [876]:

```
wordzcloud(text)
```

Out[876]:

- The admin uses friendly words as Meet, Say Hello, Here ,love,like...
- The appearance of He is more than She which indicates the gender of dog is more for male dogs