wrangle_act

September 2, 2019

Let's import everything we need

```
In [165]: import requests
          import pandas as pd
          import tweepy
          from tweepy import TweepError
          import numpy as np
          import matplotlib.pyplot as plt
          % matplotlib inline
```

```
In [166]: url = ' https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predic
          r = requests.get(url, allow_redirects=True)
          open('image-predictions.tsv', 'wb').write(r.content)
```

```
Out[166]: 335079
```

Loading the Data

```
In [167]: df_image_preds = pd.read_csv('image-predictions.tsv',delimiter='\t',encoding='utf-8')
          df_image_preds_original = df_image_preds.copy
          df_image_preds.head()
```

```
Out[167]:              tweet_id                                          jpg_url  \
          0  666020888022790149  https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg
          1  666029285002620928  https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg
          2  666033412701032449  https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg
          3  666044226329800704  https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg
          4  666049248165822465  https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg

             img_num                     p1   p1_conf  p1_dog                 p2  \
          0        1  Welsh_springer_spaniel  0.465074    True             collie
          1        1                redbone  0.506826    True  miniature_pinscher
          2        1         German_shepherd  0.596461    True            malinois
          3        1     Rhodesian_ridgeback  0.408143    True             redbone
          4        1      miniature_pinscher  0.560311    True          Rottweiler

              p2_conf  p2_dog                   p3   p3_conf  p3_dog
          0  0.156665    True    Shetland_sheepdog  0.061428    True
```

```
1  0.074192    True  Rhodesian_ridgeback  0.072010    True
2  0.138584    True            bloodhound  0.116197    True
3  0.360687    True   miniature_pinscher  0.222752    True
4  0.243682    True              Doberman  0.154629    True
```

In [168]:
```
df_twitter = pd.read_csv('twitter-archive-enhanced.csv')
df_twitter_enhanced_original = df_twitter.copy()
df_twitter.head()
```

Out[168]:

```
             tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
0  892420643555336193                    NaN                  NaN
1  892177421306343426                    NaN                  NaN
2  891815181378084864                    NaN                  NaN
3  891689557279858688                    NaN                  NaN
4  891327558926688256                    NaN                  NaN

                   timestamp  \
0  2017-08-01 16:23:56 +0000
1  2017-08-01 00:17:27 +0000
2  2017-07-31 00:18:03 +0000
3  2017-07-30 15:58:51 +0000
4  2017-07-29 16:00:24 +0000

                                              source  \
0  <a href="http://twitter.com/download/iphone" r...
1  <a href="http://twitter.com/download/iphone" r...
2  <a href="http://twitter.com/download/iphone" r...
3  <a href="http://twitter.com/download/iphone" r...
4  <a href="http://twitter.com/download/iphone" r...

                                                text  retweeted_status_id  \
0  This is Phineas. He's a mystical boy. Only eve...                  NaN
1  This is Tilly. She's just checking pup on you...                  NaN
2  This is Archie. He is a rare Norwegian Pouncin...                  NaN
3  This is Darla. She commenced a snooze mid meal...                  NaN
4  This is Franklin. He would like you to stop ca...                  NaN

   retweeted_status_user_id retweeted_status_timestamp  \
0                       NaN                       NaN
1                       NaN                       NaN
2                       NaN                       NaN
3                       NaN                       NaN
4                       NaN                       NaN

                                        expanded_urls  rating_numerator  \
0  https://twitter.com/dog_rates/status/892420643...                13
1  https://twitter.com/dog_rates/status/892177421...                13
2  https://twitter.com/dog_rates/status/891815181...                12
```

```
3  https://twitter.com/dog_rates/status/891689557...                13
4  https://twitter.com/dog_rates/status/891327558...                12

   rating_denominator      name doggo floofer pupper puppo
0                  10   Phineas  None    None   None  None
1                  10     Tilly  None    None   None  None
2                  10    Archie  None    None   None  None
3                  10     Darla  None    None   None  None
4                  10  Franklin  None    None   None  None
```

0.0.1 Collecting twitter data using Tweepy

Now, let's setup the twitter code, to allow us to retrieve more data about the tweets.

```
In [169]: # Fill the X's with the credentials obtained by
          # following the above mentioned procedure.
          consumer_key = ""
          consumer_secret = ""
          access_key = ""
          access_secret = ""

          # Function to extract tweets
          def get_tweet_data(id_of_tweet):

                  # Authorization to consumer key and consumer secret
                  auth = tweepy.OAuthHandler(consumer_key, consumer_secret)

                  # Access to user's access key and access secret
                  auth.set_access_token(access_key, access_secret)

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

                  tweet = api.get_status(id_of_tweet)
                  return tweet.text, tweet.favorite_count, tweet.retweet_count, tweet._json


          # Testing the function
          # get_tweet_data("666020888022790149")
```

Let's move to creating a fresh dataframe from collected data. Now, this is where I noticed issue number 1. Some of the twitter ids are invalid.

> This is the code used to generate the tweet_json.txt. But, it is commented out to allow the entire notebook to be executed easily, without having to wait 30 mins everytime.

```
In [170]: df = df_twitter.copy()
          """
          invalid_ids = []
```

```
        twitter_json_dict = []

        for value in df.itertuples():
            try:
                text, fav_count, retweet_count, full_json = get_tweet_data(value.tweet_id)

                json_dict = {
                    'tweet_id':value.tweet_id,
                    'tweet_fav_count':fav_count,
                    'tweet_retweet_count':retweet_count,
                    'tweet_full_json':full_json,
                }
                twitter_json_dict.append(json_dict)

                if value.Index % 200 == 0:
                    print(value.Index, "of", len(df))

            except TweepError as te:
                invalid_ids.append(value)

        df_twitter_json = pd.DataFrame(twitter_json_dict)
        df_twitter_json.to_csv('tweet_json.txt')
        df_twitter_json.head()
        """
```

Out[170]: '\ninvalid_ids = []\n\ntwitter_json_dict = []\n\nfor value in df.itertuples():\n   tr

0.0.2 Loading twitter data back from created json

In [171]:
```
df_twitter = pd.read_csv('tweet_json.txt')
df_twitter_original = df_twitter.copy()
df_twitter.head()
```

Out[171]:

	Unnamed: 0	tweet_fav_count	tweet_full_json	tweet_id
0	0	37165	{'created_at': 'Tue Aug 01 16:23:56 +0000 2017...	892420643555336193
1	1	31966	{'created_at': 'Tue Aug 01 00:17:27 +0000 2017...	892177421306343426
2	2	24071	{'created_at': 'Mon Jul 31 00:18:03 +0000 2017...	891815181378084864
3	3	40488	{'created_at': 'Sun Jul 30 15:58:51 +0000 2017...	891689557279858688
4	4	38711	{'created_at': 'Sat Jul 29 16:00:24 +0000 2017...	891327558926688256

```
   tweet_retweet_count
0                 7950
1                 5905
2                 3904
3                 8105
4                 8787
```

0.0.3 Combining all of the data

Before trying to find and solve all of the issues in the data I thought, it might be easier to combine all of the data together first and then do the wrangling, so here we go.

```
In [172]: df_image_preds.head()
          df_twitter.head()
          df_outer = pd.merge(df_twitter, df_image_preds, on='tweet_id', how='outer')
          df_outer = pd.merge(df_outer, df, on='tweet_id', how='outer')
          df_outer.info()
          df_outer.head()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2356 entries, 0 to 2355
Data columns (total 32 columns):
Unnamed: 0                    2333 non-null float64
tweet_fav_count               2333 non-null float64
tweet_full_json               2333 non-null object
tweet_id                      2356 non-null int64
tweet_retweet_count           2333 non-null float64
jpg_url                       2075 non-null object
img_num                       2075 non-null float64
p1                            2075 non-null object
p1_conf                       2075 non-null float64
p1_dog                        2075 non-null object
p2                            2075 non-null object
p2_conf                       2075 non-null float64
p2_dog                        2075 non-null object
p3                            2075 non-null object
p3_conf                       2075 non-null float64
p3_dog                        2075 non-null object
in_reply_to_status_id         78 non-null float64
in_reply_to_user_id           78 non-null float64
timestamp                     2356 non-null object
source                        2356 non-null object
text                          2356 non-null object
retweeted_status_id           181 non-null float64
retweeted_status_user_id      181 non-null float64
retweeted_status_timestamp    181 non-null object
expanded_urls                 2297 non-null object
rating_numerator              2356 non-null int64
```

```
rating_denominator            2356 non-null int64
name                          2356 non-null object
doggo                         2356 non-null object
floofer                       2356 non-null object
pupper                        2356 non-null object
puppo                         2356 non-null object
dtypes: float64(11), int64(3), object(18)
memory usage: 607.4+ KB
```

Out[172]:

	Unnamed: 0	tweet_fav_count	tweet_full_json	tweet_id	tweet_retweet_count	jpg_url	img_num	p1	p1_conf	p1_dog	...	retweeted_status_user_id	retweeted_status_timestamp	expanded_urls	rating_numerator
0	0.0	37165.0	{'created_at': 'Tue Aug 01 16:23:56 +0000 2017...	892420643555336193	7950.0	https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg	1.0	orange	0.097049	False	...	NaN	NaN	https://twitter.com/dog_rates/status/892420643...	13
1	1.0	31966.0	{'created_at': 'Tue Aug 01 00:17:27 +0000 2017...	892177421306343426	5905.0	https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg	1.0	Chihuahua	0.323581	True	...	NaN	NaN	https://twitter.com/dog_rates/status/892177421...	13
2	2.0	24071.0	{'created_at': 'Mon Jul 31 00:18:03 +0000 2017...	891815181378084864	3904.0	https://pbs.twimg.com/media/DGBdLU1WsAANxJ9.jpg	1.0	Chihuahua	0.716012	True	...	NaN	NaN		
3	3.0	40488.0	{'created_at': 'Sun Jul 30 15:58:51 +0000 2017...	891689557279858688	8105.0	https://pbs.twimg.com/media/DF_q7IAWsAEuuN8.jpg	1.0	paper_towel	0.170278	False	...	NaN	NaN		
4	4.0	38711.0	{'created_at': 'Sat Jul 29 16:00:24 +0000 2017...	891327558926688256	8787.0	https://pbs.twimg.com/media/DF6hr6BUMAAzZgT.jpg	2.0	basset	0.555712	True	...	NaN	NaN		

```
2  https://twitter.com/dog_rates/status/891815181...              12
3  https://twitter.com/dog_rates/status/891689557...              13
4  https://twitter.com/dog_rates/status/891327558...              12

   rating_denominator      name  doggo  floofer pupper puppo
0                  10   Phineas   None     None   None  None
1                  10     Tilly   None     None   None  None
2                  10    Archie   None     None   None  None
3                  10     Darla   None     None   None  None
4                  10  Franklin   None     None   None  None

[5 rows x 32 columns]
```

In [ ]:

0.0.4 Data Wrangling

Quality Issues

1. Dataset has a unnamed column
2. Retweets need to be removed
3. Replies need to be removed
4. Columns associated with retweets and replies need to be dropped
5. `tweet_id` is an int it needs to be string
6. `timestamp` column needs to be converted to datetime
7. `name` column has some serious quality issues and should be dropped
8. There are fewer rows in the image predictions table than there are in the twitter archieve table
9. `doggo`, `floofer`, `pupper` and `puppo` could be made boolean
10. Add proper punctuation to the predictions
11. Column names are not readable

Tidiness Issues

1. `source` column in the dataset is unreadble
2. `doggo`, `floofer`, `pupper` and `puppo` columns need to be a categorical variable

0.0.5 Resolving Issues

Quality Issues

1. The Dataset has a column called `Unnamed: 0`. This should be dropped.

In [173]:
```
df_outer.drop(columns=['Unnamed: 0'], inplace=True)
```

Test

In [174]:
```
df_outer.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2356 entries, 0 to 2355
Data columns (total 31 columns):
tweet_fav_count               2333 non-null float64
tweet_full_json               2333 non-null object
tweet_id                      2356 non-null int64
tweet_retweet_count           2333 non-null float64
jpg_url                       2075 non-null object
img_num                       2075 non-null float64
p1                            2075 non-null object
p1_conf                       2075 non-null float64
p1_dog                        2075 non-null object
p2                            2075 non-null object
p2_conf                       2075 non-null float64
p2_dog                        2075 non-null object
p3                            2075 non-null object
p3_conf                       2075 non-null float64
p3_dog                        2075 non-null object
in_reply_to_status_id         78 non-null float64
in_reply_to_user_id           78 non-null float64
timestamp                     2356 non-null object
source                        2356 non-null object
text                          2356 non-null object
retweeted_status_id           181 non-null float64
retweeted_status_user_id      181 non-null float64
retweeted_status_timestamp    181 non-null object
expanded_urls                 2297 non-null object
rating_numerator              2356 non-null int64
rating_denominator            2356 non-null int64
name                          2356 non-null object
doggo                         2356 non-null object
floofer                       2356 non-null object
pupper                        2356 non-null object
puppo                         2356 non-null object
dtypes: float64(10), int64(3), object(18)
memory usage: 589.0+ KB
```

2. Retweets need to be removed. To remove the retweets we need to select rows with `in_reply_to_status_id` not null and remove those.

Let's count the number of retweets

```
In [175]: print("Shape before removing retweets:",df_outer.shape)
          index_names = df_outer[df_outer['retweeted_status_user_id'].notna()].index
          print("Number of retweets:",len(index_names))

          # Delete these row indexes from dataFrame
```

```
        df_outer.drop(index_names , inplace=True)
        print("Shape after removing retweets:",df_outer.shape)
```

```
Shape before removing retweets: (2356, 31)
Number of retweets: 181
Shape after removing retweets: (2175, 31)
```

Test

```
In [176]: index_names = df_outer[df_outer['retweeted_status_user_id'].notna()].index
          print("Number of retweets:",len(index_names))
```

```
Number of retweets: 0
```

3. Replies need to be removed There are certain rows having a `in_reply_to_status_id` these should be removed.

Let's count how many of such replies do we have.

```
In [177]: print("Shape before removing replies:",df_outer.shape)
          index_names = df_outer[df_outer['in_reply_to_status_id'].notna()].index
          print("Number of replies:",len(index_names))

          # Delete these row indexes from dataFrame
          df_outer.drop(index_names , inplace=True)
          print("Shape after removing replies:",df_outer.shape)
```

```
Shape before removing replies: (2175, 31)
Number of replies: 78
Shape after removing replies: (2097, 31)
```

Test

```
In [178]: index_names = df_outer[df_outer['in_reply_to_status_id'].notna()].index
          print("Number of replies:",len(index_names))
```

```
Number of replies: 0
```

4. Columns associated with retweets and replies need to be dropped After removing the retweets the in_reply_to_status_id and in_reply_to_user_id columns need to be dropped

```
In [179]: df_outer.drop(columns=['in_reply_to_status_id','in_reply_to_user_id',
                                 'retweeted_status_id','retweeted_status_user_id',
                                 'retweeted_status_timestamp'], inplace=True)
```

Test

```
In [180]: df_outer.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2097 entries, 0 to 2344
Data columns (total 26 columns):
tweet_fav_count        2090 non-null float64
tweet_full_json        2090 non-null object
tweet_id               2097 non-null int64
tweet_retweet_count    2090 non-null float64
jpg_url                1971 non-null object
img_num                1971 non-null float64
p1                     1971 non-null object
p1_conf                1971 non-null float64
p1_dog                 1971 non-null object
p2                     1971 non-null object
p2_conf                1971 non-null float64
p2_dog                 1971 non-null object
p3                     1971 non-null object
p3_conf                1971 non-null float64
p3_dog                 1971 non-null object
timestamp              2097 non-null object
source                 2097 non-null object
text                   2097 non-null object
expanded_urls          2094 non-null object
rating_numerator       2097 non-null int64
rating_denominator     2097 non-null int64
name                   2097 non-null object
doggo                  2097 non-null object
floofer                2097 non-null object
pupper                 2097 non-null object
puppo                  2097 non-null object
dtypes: float64(6), int64(3), object(17)
memory usage: 442.3+ KB
```

5. Tweet ID is an int it needs to be string

```
In [181]: df_outer.tweet_id = df_outer.tweet_id.astype(str)
```

Test

```
In [182]: df_outer.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2097 entries, 0 to 2344
Data columns (total 26 columns):
tweet_fav_count        2090 non-null float64
tweet_full_json        2090 non-null object
tweet_id               2097 non-null object
```

```
tweet_retweet_count    2090 non-null float64
jpg_url                1971 non-null object
img_num                1971 non-null float64
p1                     1971 non-null object
p1_conf                1971 non-null float64
p1_dog                 1971 non-null object
p2                     1971 non-null object
p2_conf                1971 non-null float64
p2_dog                 1971 non-null object
p3                     1971 non-null object
p3_conf                1971 non-null float64
p3_dog                 1971 non-null object
timestamp              2097 non-null object
source                 2097 non-null object
text                   2097 non-null object
expanded_urls          2094 non-null object
rating_numerator       2097 non-null int64
rating_denominator     2097 non-null int64
name                   2097 non-null object
doggo                  2097 non-null object
floofer                2097 non-null object
pupper                 2097 non-null object
puppo                  2097 non-null object
dtypes: float64(6), int64(2), object(18)
memory usage: 442.3+ KB
```

6. `timestamp` column needs to be converted to datetime

```
In [183]: df_outer.timestamp = pd.to_datetime(df_outer['timestamp'])
```

Test

```
In [184]: df_outer.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2097 entries, 0 to 2344
Data columns (total 26 columns):
tweet_fav_count        2090 non-null float64
tweet_full_json        2090 non-null object
tweet_id               2097 non-null object
tweet_retweet_count    2090 non-null float64
jpg_url                1971 non-null object
img_num                1971 non-null float64
p1                     1971 non-null object
p1_conf                1971 non-null float64
p1_dog                 1971 non-null object
p2                     1971 non-null object
p2_conf                1971 non-null float64
```

```
p2_dog                1971 non-null object
p3                    1971 non-null object
p3_conf               1971 non-null float64
p3_dog                1971 non-null object
timestamp             2097 non-null datetime64[ns]
source                2097 non-null object
text                  2097 non-null object
expanded_urls         2094 non-null object
rating_numerator      2097 non-null int64
rating_denominator    2097 non-null int64
name                  2097 non-null object
doggo                 2097 non-null object
floofer               2097 non-null object
pupper                2097 non-null object
puppo                 2097 non-null object
dtypes: datetime64[ns](1), float64(6), int64(2), object(17)
memory usage: 442.3+ KB
```

7. `name` column has some serious quality issues and should be fixed

```
In [185]: df_outer.name.value_counts().head(5)
```

```
Out[185]: None       603
          a           55
          Charlie     11
          Lucy        11
          Oliver      10
          Name: name, dtype: int64
```

Let's convert all the `None` and `a` to NaNs.

```
In [186]: df_outer.replace(to_replace=['None','a'], value=np.nan, inplace=True)
```

Test

```
In [187]: df_outer.name.value_counts().head(5)
```

```
Out[187]: Charlie    11
          Lucy       11
          Oliver     10
          Cooper     10
          Penny       9
          Name: name, dtype: int64
```

8. There are fewer rows in the image predictions table than there are in the twitter archieve table

```
In [188]: df_outer.tweet_id.shape
```

```
Out[188]: (2097,)

In [189]: df_outer.img_num.describe()

Out[189]: count    1971.000000
          mean        1.201928
          std         0.559020
          min         1.000000
          25%         1.000000
          50%         1.000000
          75%         1.000000
          max         4.000000
          Name: img_num, dtype: float64
```

Since, we don't have access to the model used to generate the predictions, I am not sure how we can fix this.

9. `doggo`**,** `floofer`**,** `pupper` **and** `puppo` **could be made boolean**

```
In [190]: df_outer.doggo.value_counts()

Out[190]: doggo    83
          Name: doggo, dtype: int64

In [191]: columns = ['doggo','floofer','pupper','puppo']
          for column in columns:
              df_outer.replace(to_replace=[column], value=True, inplace=True)
```

Test

```
In [192]: df_outer.doggo.value_counts()

Out[192]: True    83
          Name: doggo, dtype: int64

In [193]: df_outer.floofer.value_counts()

Out[193]: True    10
          Name: floofer, dtype: int64

In [194]: df_outer.pupper.value_counts()

Out[194]: True    230
          Name: pupper, dtype: int64

In [195]: df_outer.puppo.value_counts()

Out[195]: True    24
          Name: puppo, dtype: int64
```

9. Add proper punctuations to predictions The predictions are not capitalized and are missing some punctuation marks. Let's fix those.

```
In [196]: df_outer.p1.value_counts().head(10)
          df_outer.p1.replace('_', ' ', regex=True, inplace=True)
          df_outer.p1 = df_outer.p1.str.title()
```

Test

```
In [197]: df_outer.p1.value_counts().head(10)
```

```
Out[197]: Golden Retriever      137
          Labrador Retriever     94
          Pembroke               88
          Chihuahua              78
          Pug                    54
          Chow                   41
          Samoyed                40
          Pomeranian             38
          Toy Poodle             37
          Malamute               29
          Name: p1, dtype: int64
```

0.0.6 Tidiness Issues

1. `source` column in the dataset is unreadble Let's replace this with something easier to read.

```
In [198]: df_outer.source.value_counts()
```

```
Out[198]: <a href="http://twitter.com/download/iphone" rel="nofollow">Twitter for iPhone</a>
          <a href="http://vine.co" rel="nofollow">Vine - Make a Scene</a>
          <a href="http://twitter.com" rel="nofollow">Twitter Web Client</a>
          <a href="https://about.twitter.com/products/tweetdeck" rel="nofollow">TweetDeck</a>
          Name: source, dtype: int64
```

```
In [199]: df_outer.source.replace('<a href="http://twitter.com/download/iphone" rel="nofollow">T
                                  'iphone', regex=True, inplace=True)
          df_outer.source.replace('<a href="http://vine.co" rel="nofollow">Vine - Make a Scene</
                                  'vine', regex=True, inplace=True)
          df_outer.source.replace('<a href="http://twitter.com" rel="nofollow">Twitter Web Clien
                                  'web', regex=True, inplace=True)
          df_outer.source.replace('<a href="https://about.twitter.com/products/tweetdeck" rel="n
                                  'tweetdeck', regex=True, inplace=True)
```

Test

```
In [200]: df_outer.source.value_counts()
```

```
Out[200]: iphone       1964
          vine           91
          web            31
          tweetdeck      11
          Name: source, dtype: int64
```

4. `doggo`, `floofer`, `pupper` **and** `puppo` **columns need to be a categorical variable**

```
In [201]: def get_category(d,f,p,po):
              if np.isnan(d):
                  return 'doggo'
              elif np.isnan(f):
                  return 'floofer'
              elif np.isnan(p):
                  return 'pupper'
              elif np.isnan(po):
                  return 'puppo'
              return

          for value in df_outer.itertuples():
              df_outer.loc[value.Index,'category'] = get_category(value.doggo, value.floofer, va

          df_outer.drop(['doggo', 'floofer', 'pupper', 'puppo'], inplace = True, axis = 1)
```

Test

```
In [202]: df_outer.category.value_counts()
```

```
Out[202]: doggo      2014
          floofer      82
          pupper        1
          Name: category, dtype: int64
```

0.0.7 Storing the data

Now, that we have cleaned the data we can store it to a csv file.

```
In [203]: df_outer.to_csv('master-dataset.csv', index=False)
```

Test

```
In [204]: df = pd.read_csv('master-dataset.csv')
          df.head()
```

```
Out[204]:    tweet_fav_count                                         tweet_full_json  \
          0          37165.0  {'created_at': 'Tue Aug 01 16:23:56 +0000 2017...
          1          31966.0  {'created_at': 'Tue Aug 01 00:17:27 +0000 2017...
          2          24071.0  {'created_at': 'Mon Jul 31 00:18:03 +0000 2017...
          3          40488.0  {'created_at': 'Sun Jul 30 15:58:51 +0000 2017...
          4          38711.0  {'created_at': 'Sat Jul 29 16:00:24 +0000 2017...

                       tweet_id  tweet_retweet_count  \
          0  892420643555336193               7950.0
          1  892177421306343426               5905.0
          2  891815181378084864               3904.0
          3  891689557279858688               8105.0
```

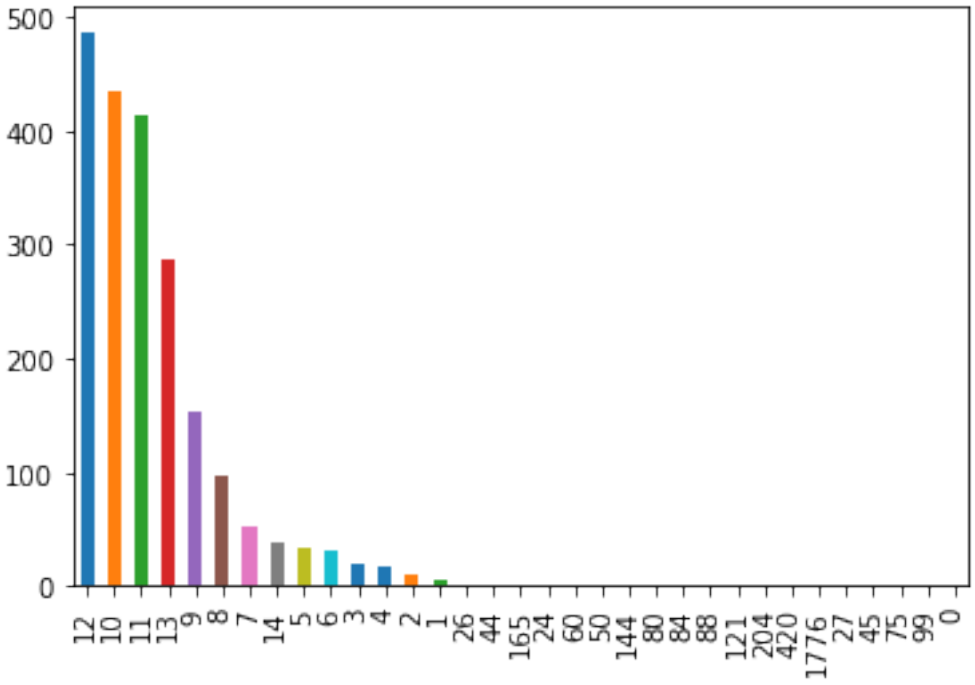
```
4  891327558926688256               8787.0

                                          jpg_url  img_num           p1  \
0  https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg      1.0       Orange
1  https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg      1.0    Chihuahua
2  https://pbs.twimg.com/media/DGBdLU1WsAANxJ9.jpg      1.0    Chihuahua
3  https://pbs.twimg.com/media/DF_q7IAWsAEuuN8.jpg      1.0  Paper Towel
4  https://pbs.twimg.com/media/DF6hr6BUMAAzZgT.jpg      2.0       Basset

    p1_conf p1_dog                   p2    ...      p3_conf p3_dog  \
0  0.097049  False               bagel    ...     0.076110  False
1  0.323581   True            Pekinese    ...     0.068957   True
2  0.716012   True            malamute    ...     0.031379   True
3  0.170278  False  Labrador_retriever    ...     0.040836  False
4  0.555712   True    English_springer    ...     0.175219   True

            timestamp  source  \
0  2017-08-01 16:23:56  iphone
1  2017-08-01 00:17:27  iphone
2  2017-07-31 00:18:03  iphone
3  2017-07-30 15:58:51  iphone
4  2017-07-29 16:00:24  iphone

                                              text  \
0  This is Phineas. He's a mystical boy. Only eve...
1  This is Tilly. She's just checking pup on you...
2  This is Archie. He is a rare Norwegian Pouncin...
3  This is Darla. She commenced a snooze mid meal...
4  This is Franklin. He would like you to stop ca...

                                       expanded_urls rating_numerator  \
0  https://twitter.com/dog_rates/status/892420643...               13
1  https://twitter.com/dog_rates/status/892177421...               13
2  https://twitter.com/dog_rates/status/891815181...               12
3  https://twitter.com/dog_rates/status/891689557...               13
4  https://twitter.com/dog_rates/status/891327558...               12

  rating_denominator      name  category
0                 10   Phineas     doggo
1                 10     Tilly     doggo
2                 10    Archie     doggo
3                 10     Darla     doggo
4                 10  Franklin     doggo

[5 rows x 23 columns]
```

0.1 Insights

0.1.1 1. How are the dog ratings distributed?

We understand from the graph that a majority of the dogs score *12* on the scale.

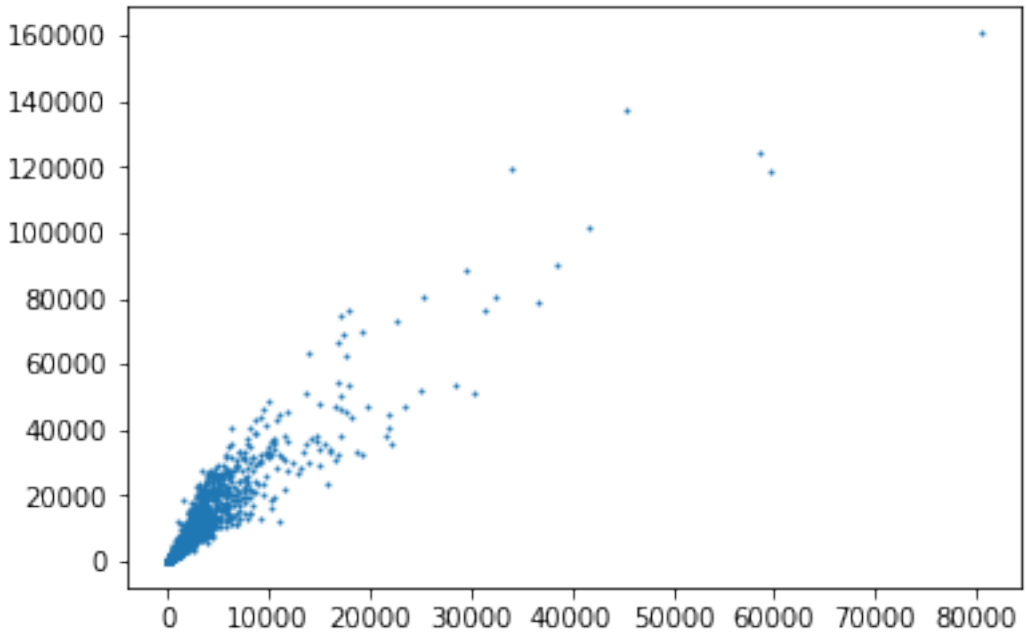
```
In [205]: df_outer.rating_numerator.value_counts().plot(kind="bar");
```



0.1.2 2. How does the retweet count compare with the favourite count?

Here, we see medium-coorelation between the number of retweet and the number of favourites. Thus, we can deduce that if a photo has more retweet it is highly likely to have greater number of people who have marked it as favourites.

```
In [206]: plt.plot(df_outer.tweet_retweet_count, df_outer.tweet_fav_count,
                   linestyle='', marker='o', markersize=1);
```



0.1.3 3. Has the social media engagement of the account grown over time?

From the graph we can clearly see that the twitter account in question has grown consistently through the years.

```
In [207]: df_outer['avg_fav_count']=df_outer.tweet_fav_count.rolling(window=50).mean()
          plt.plot(df_outer.timestamp,df_outer.avg_fav_count,);
```

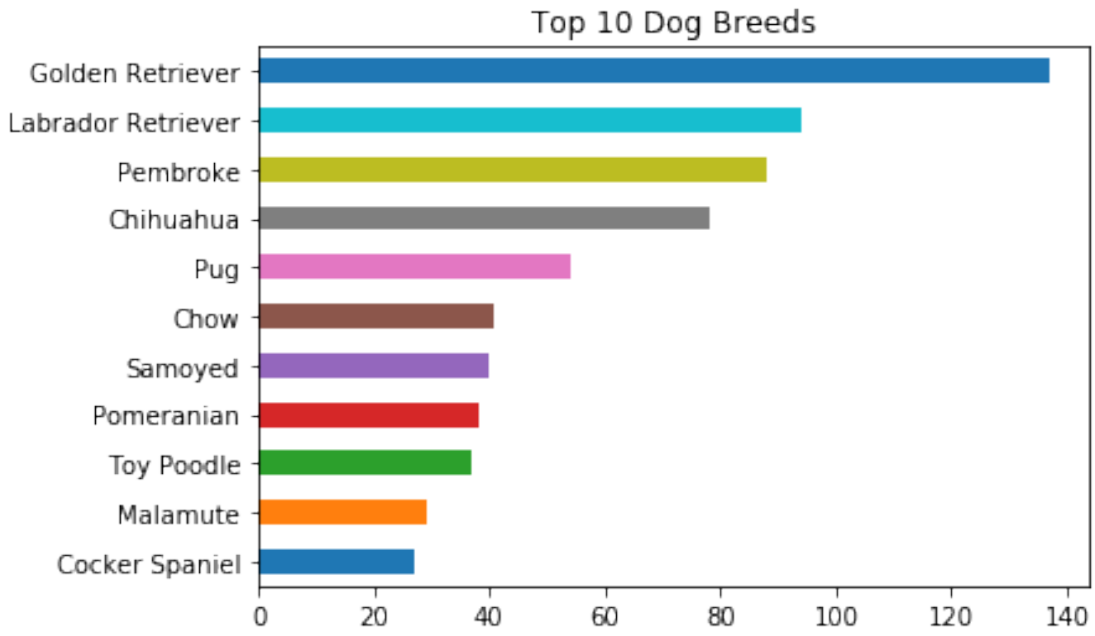
0.1.4 4. How are the dog breeds distributed?

Thus, we can conclude that the most common dog breed is Golden Retriever.

```
In [208]: df_outer.p1.value_counts().head(7)
```

```
Out[208]: Golden Retriever      137
          Labrador Retriever     94
          Pembroke               88
          Chihuahua              78
          Pug                    54
          Chow                   41
          Samoyed                40
          Name: p1, dtype: int64
```

```
In [209]: df_outer.p1.value_counts()[10::-1].plot(kind='barh')
          plt.title('Top 10 Dog Breeds')
          plt.show()
```



0.1.5 Conclusion

Thus we conclude from all of the data that - people love Golden Retrievers! And all dogs in general. We also understand that consistent posting on twitter will lead to bigger followings overtime