

wrangle_act

July 23, 2022

1 Project: Wrangling and Analyze Data

```
In [1]: # import statements
import pandas as pd
import numpy as np
import os
import re
import requests
import tweepy
import seaborn as sb
import matplotlib.pyplot as plt
from tweepy import OAuthHandler
import json
from timeit import default_timer as timer
```

1.1 Data Gathering

In the cell below, gather **all** three pieces of data for this project and load them in the notebook.
Note: the methods required to gather each data are different. 1. Directly download the WeRateDogs Twitter archive data (twitter_archive_enhanced.csv)

```
In [2]: # Read in WeRateDogs Twitter archive
archive_df = pd.read_csv('twitter-archive-enhanced.csv')
```

2. Use the Requests library to download the tweet image prediction (image_predictions.tsv)

```
In [3]: # Get image predictions file
url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions'
response = requests.get(url)

# Save image predictions file

with open("image-predictions.tsv", mode='wb') as file:
    file.write(response.content)
# read in image predictions
image_preds = pd.read_csv('image-predictions.tsv', sep='\t')
```

3. Use the Tweepy library to query additional data via the Twitter API (tweet_json.txt)

```

In [4]: # Twitter dev keys
        consumer_key = ""
        consumer_secret = ""
        access_token = ""
        access_secret = ""

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

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

        # tweet ids from weratedogs twitter archive
        tweet_ids = archive_df.tweet_id.values

        # Query Twitter's API for JSON data for each tweet ID in the Twitter archive
        count = 0
        fails_dict = {}
        start = timer()
        with open('tweet_json.txt', 'w') as outfile:
            for tweet_id in tweet_ids:
                count += 1
                print(str(count) + ": " + str(tweet_id))
                try:
                    status = api.get_status(tweet_id, tweet_mode='extended')
                    print("Success")
                    info = {'tweet_id' : str(tweet_id) , 'Retweets' : str(status.retweet_count),
                        json.dump(info, outfile)
                        outfile.write('\n')
                        tweepy.TweepError as e:
                    print("Fail")
                    fails_dict[tweet_id] = e
                pass
            end = timer()
            print(end - start)
            print(fails_dict)except

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2283: 667211855547486208
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2284: 667200525029539841
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2285: 667192066997374976
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2318: 666644823164719104
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2319: 666454714377183233
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2320: 666447344410484738
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2340: 666102155909144576

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2341: 666099513787052032

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2342: 666094000022159362

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2344: 666073100786774016

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2345: 666071193221509120

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2346: 666063827256086533

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2348: 666057090499244032

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2349: 666055525042405380

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2350: 666051853826850816

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2351: 666050758794694657

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2352: 666049248165822465

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2353: 666044226329800704

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2354: 666033412701032449

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2355: 666029285002620928

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2356: 666020888022790149

Success

1908.988929646

{888202515573088257: TweepError([{'code': 144, 'message': 'No status found with that ID.'}],), 8

1.2 Assessing Data

In this section, detect and document at least **eight (8) quality issues and two (2) tidiness issue**. You must use **both** visual assessment programmatic assesement to assess the data.

Note: pay attention to the following key points when you access the data.

- You only want original ratings (no retweets) that have images. Though there are 5000+ tweets in the dataset, not all are dog ratings and some are retweets.
- Assessing and cleaning the entire dataset completely would require a lot of time, and is not necessary to practice and demonstrate your skills in data wrangling. Therefore, the requirements of this project are only to assess and clean at least 8 quality issues and at least 2 tidiness issues in this dataset.
- The fact that the rating numerators are greater than the denominators does not need to be cleaned. This [unique rating system](#) is a big part of the popularity of WeRateDogs.
- You do not need to gather the tweets beyond August 1st, 2017. You can, but note that you won't be able to gather the image predictions for these tweets since you don't have access to the algorithm used.

```
In [4]: archive_df.head()
```

```
Out[4]:
```

	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

In [5]: archive_df.columns

Out[5]: Index(['tweet_id', 'in_reply_to_status_id', 'in_reply_to_user_id', 'timestamp', '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 [6]: archive_df.describe()

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
count	2.356000e+03	7.800000e+01	7.800000e+01	
mean	7.427716e+17	7.455079e+17	2.014171e+16	
std	6.856705e+16	7.582492e+16	1.252797e+17	
min	6.660209e+17	6.658147e+17	1.185634e+07	
25%	6.783989e+17	6.757419e+17	3.086374e+08	
50%	7.196279e+17	7.038708e+17	4.196984e+09	
75%	7.993373e+17	8.257804e+17	4.196984e+09	
max	8.924206e+17	8.862664e+17	8.405479e+17	

	retweeted_status_id	retweeted_status_user_id	rating_numerator	\
count	1.810000e+02	1.810000e+02	2356.000000	
mean	7.720400e+17	1.241698e+16	13.126486	
std	6.236928e+16	9.599254e+16	45.876648	
min	6.661041e+17	7.832140e+05	0.000000	
25%	7.186315e+17	4.196984e+09	10.000000	
50%	7.804657e+17	4.196984e+09	11.000000	

75%	8.203146e+17	4.196984e+09	12.000000
max	8.874740e+17	7.874618e+17	1776.000000

	rating_denominator
count	2356.000000
mean	10.455433
std	6.745237
min	0.000000
25%	10.000000
50%	10.000000
75%	10.000000
max	170.000000

In [7]: archive_df.query('rating_numerator <1 or rating_numerator >15 ')

```
Out[7]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
55	881633300179243008	8.816070e+17	4.738443e+07	
188	855862651834028034	8.558616e+17	1.943518e+08	
189	855860136149123072	8.558585e+17	1.361572e+07	
290	838150277551247360	8.381455e+17	2.195506e+07	
313	835246439529840640	8.352460e+17	2.625958e+07	
315	835152434251116546	NaN	NaN	
340	832215909146226688	NaN	NaN	
433	820690176645140481	NaN	NaN	
516	810984652412424192	NaN	NaN	
695	786709082849828864	NaN	NaN	
763	778027034220126208	NaN	NaN	
902	758467244762497024	NaN	NaN	
979	749981277374128128	NaN	NaN	
1016	746906459439529985	7.468859e+17	4.196984e+09	
1120	731156023742988288	NaN	NaN	
1202	716439118184652801	NaN	NaN	
1228	713900603437621249	NaN	NaN	
1254	710658690886586372	NaN	NaN	
1274	709198395643068416	NaN	NaN	
1351	704054845121142784	NaN	NaN	
1433	697463031882764288	NaN	NaN	
1634	684225744407494656	6.842229e+17	4.196984e+09	
1635	684222868335505415	NaN	NaN	
1663	682808988178739200	6.827884e+17	4.196984e+09	
1712	680494726643068929	NaN	NaN	
1779	677716515794329600	NaN	NaN	
1843	675853064436391936	NaN	NaN	
2074	670842764863651840	NaN	NaN	

	timestamp	\
55	2017-07-02 21:58:53 +0000	
188	2017-04-22 19:15:32 +0000	

189 2017-04-22 19:05:32 +0000
 290 2017-03-04 22:12:52 +0000
 313 2017-02-24 21:54:03 +0000
 315 2017-02-24 15:40:31 +0000
 340 2017-02-16 13:11:49 +0000
 433 2017-01-15 17:52:40 +0000
 516 2016-12-19 23:06:23 +0000
 695 2016-10-13 23:23:56 +0000
 763 2016-09-20 00:24:34 +0000
 902 2016-07-28 01:00:57 +0000
 979 2016-07-04 15:00:45 +0000
 1016 2016-06-26 03:22:31 +0000
 1120 2016-05-13 16:15:54 +0000
 1202 2016-04-03 01:36:11 +0000
 1228 2016-03-27 01:29:02 +0000
 1254 2016-03-18 02:46:49 +0000
 1274 2016-03-14 02:04:08 +0000
 1351 2016-02-28 21:25:30 +0000
 1433 2016-02-10 16:51:59 +0000
 1634 2016-01-05 04:11:44 +0000
 1635 2016-01-05 04:00:18 +0000
 1663 2016-01-01 06:22:03 +0000
 1712 2015-12-25 21:06:00 +0000
 1779 2015-12-18 05:06:23 +0000
 1843 2015-12-13 01:41:41 +0000
 2074 2015-11-29 05:52:33 +0000

source \
 55 <a href="http://twitter.com/download/iphone" r...
 188 <a href="http://twitter.com/download/iphone" r...
 189 <a href="http://twitter.com/download/iphone" r...
 290 <a href="http://twitter.com/download/iphone" r...
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1433 <a href="http://twitter.com/download/iphone" r...
 1634 <a href="http://twitter.com/download/iphone" r...
 1635 <a href="http://twitter.com/download/iphone" r...
 1663 <a href="http://twitter.com/download/iphone" r...
 1712 <a href="http://twitter.com/download/iphone" r...
 1779 <a href="http://twitter.com/download/iphone" r...
 1843 <a href="http://twitter.com/download/iphone" r...
 2074 <a href="http://twitter.com/download/iphone" r...

	text	retweeted_status_id \
55	@roushfenway These are good dogs but 17/10 is ...	NaN
188	@dhmontgomery We also gave snoop dogg a 420/10...	NaN
189	@s8n You tried very hard to portray this good ...	NaN
290	@markhoppus 182/10	NaN
313	@jonny_sun @Lin_Manuel ok jomny I know you're e...	NaN
315	When you're so blinded by your systematic plag...	NaN
340	RT @dog_rates: This is Logan, the Chow who liv...	7.867091e+17
433	The floofs have been released I repeat the flo...	NaN
516	Meet Sam. She smiles 24/7 & secretly aspir...	NaN
695	This is Logan, the Chow who lived. He solemnly...	NaN
763	This is Sophie. She's a Jubilant Bush Pupper. ...	NaN
902	Why does this never happen at my front door...	NaN
979	This is Atticus. He's quite simply America af...	NaN
1016	PUPDATE: can't see any. Even if I could, I cou...	NaN
1120	Say hello to this unbelievably well behaved sq...	NaN
1202	This is Bluebert. He just saw that both #Final...	NaN
1228	Happy Saturday here's 9 puppies on a bench. 99...	NaN
1254	Here's a brigade of puppies. All look very pre...	NaN
1274	From left to right:\nCletus, Jerome, Alejandro...	NaN
1351	Here is a whole flock of puppies. 60/50 I'll ...	NaN
1433	Happy Wednesday here's a bucket of pups. 44/40...	NaN
1634	Two sneaky puppies were not initially seen, mo...	NaN
1635	Someone help the girl is being mugged. Several...	NaN
1663	I'm aware that I could've said 20/16, but here...	NaN
1712	Here we have uncovered an entire battalion of ...	NaN
1779	IT'S PUPPERGEDDON. Total of 144/120 ...I think...	NaN
1843	Here we have an entire platoon of puppies. Tot...	NaN
2074	After so many requests... here you go.\n\nGood...	NaN

	retweeted_status_user_id	retweeted_status_timestamp \
55	NaN	NaN
188	NaN	NaN
189	NaN	NaN
290	NaN	NaN
313	NaN	NaN
315	NaN	NaN
340	4.196984e+09	2016-10-13 23:23:56 +0000
433	NaN	NaN

516	NaN	NaN
695	NaN	NaN
763	NaN	NaN
902	NaN	NaN
979	NaN	NaN
1016	NaN	NaN
1120	NaN	NaN
1202	NaN	NaN
1228	NaN	NaN
1254	NaN	NaN
1274	NaN	NaN
1351	NaN	NaN
1433	NaN	NaN
1634	NaN	NaN
1635	NaN	NaN
1663	NaN	NaN
1712	NaN	NaN
1779	NaN	NaN
1843	NaN	NaN
2074	NaN	NaN

	expanded_urls	rating_numerator \
55	NaN	17
188	NaN	420
189	NaN	666
290	NaN	182
313	NaN	960
315	https://twitter.com/dog_rates/status/835152434...	0
340	https://twitter.com/dog_rates/status/786709082...	75
433	https://twitter.com/dog_rates/status/820690176...	84
516	https://www.gofundme.com/sams-smile,https://tw...	24
695	https://twitter.com/dog_rates/status/786709082...	75
763	https://twitter.com/dog_rates/status/778027034...	27
902	https://twitter.com/dog_rates/status/758467244...	165
979	https://twitter.com/dog_rates/status/749981277...	1776
1016	https://twitter.com/dog_rates/status/746906459...	0
1120	https://twitter.com/dog_rates/status/731156023...	204
1202	https://twitter.com/dog_rates/status/716439118...	50
1228	https://twitter.com/dog_rates/status/713900603...	99
1254	https://twitter.com/dog_rates/status/710658690...	80
1274	https://twitter.com/dog_rates/status/709198395...	45
1351	https://twitter.com/dog_rates/status/704054845...	60
1433	https://twitter.com/dog_rates/status/697463031...	44
1634	https://twitter.com/dog_rates/status/684225744...	143
1635	https://twitter.com/dog_rates/status/684222868...	121
1663	NaN	20
1712	https://twitter.com/dog_rates/status/680494726...	26
1779	https://twitter.com/dog_rates/status/677716515...	144

1843	https://twitter.com/dog_rates/status/675853064...	88
2074	https://twitter.com/dog_rates/status/670842764...	420

	rating_denominator	name	doggo	floofer	pupper	puppo
55	10	None	None	None	None	None
188	10	None	None	None	None	None
189	10	None	None	None	None	None
290	10	None	None	None	None	None
313	0	None	None	None	None	None
315	10	None	None	None	None	None
340	10	Logan	None	None	None	None
433	70	None	None	None	None	None
516	7	Sam	None	None	None	None
695	10	Logan	None	None	None	None
763	10	Sophie	None	None	pupper	None
902	150	None	None	None	None	None
979	10	Atticus	None	None	None	None
1016	10	None	None	None	None	None
1120	170	this	None	None	None	None
1202	50	Bluebert	None	None	None	None
1228	90	None	None	None	None	None
1254	80	None	None	None	None	None
1274	50	None	None	None	None	None
1351	50	a	None	None	None	None
1433	40	None	None	None	None	None
1634	130	None	None	None	None	None
1635	110	None	None	None	None	None
1663	16	None	None	None	None	None
1712	10	None	None	None	None	None
1779	120	None	None	None	None	None
1843	80	None	None	None	None	None
2074	10	None	None	None	None	None

In [8]: archive_df.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2356 entries, 0 to 2355
Data columns (total 17 columns):
tweet_id                2356 non-null int64
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(4), int64(3), object(10)
memory usage: 313.0+ KB

```

```
In [9]: archive_df[archive_df['in_reply_to_status_id'].notnull()]
```

```

Out[9]:
   tweet_id  in_reply_to_status_id  in_reply_to_user_id \
30    886267009285017600      8.862664e+17      2.281182e+09
55    881633300179243008      8.816070e+17      4.738443e+07
64    879674319642796034      8.795538e+17      3.105441e+09
113   870726314365509632      8.707262e+17      1.648776e+07
148   863427515083354112      8.634256e+17      7.759620e+07
149   863079547188785154      6.671522e+17      4.196984e+09
179   857214891891077121      8.571567e+17      1.806710e+08
184   856526610513747968      8.558181e+17      4.196984e+09
186   856288084350160898      8.562860e+17      2.792810e+08
188   855862651834028034      8.558616e+17      1.943518e+08
189   855860136149123072      8.558585e+17      1.361572e+07
218   850333567704068097      8.503288e+17      2.195506e+07
228   848213670039564288      8.482121e+17      4.196984e+09
234   847617282490613760      8.476062e+17      4.196984e+09
251   844979544864018432      7.590995e+17      4.196984e+09
274   840698636975636481      8.406983e+17      8.405479e+17
290   838150277551247360      8.381455e+17      2.195506e+07
291   838085839343206401      8.380855e+17      2.894131e+09
313   835246439529840640      8.352460e+17      2.625958e+07
342   832088576586297345      8.320875e+17      3.058208e+07
346   831926988323639298      8.319030e+17      2.068372e+07
387   826598799820865537      8.265984e+17      4.196984e+09
409   823333489516937216      8.233264e+17      1.582854e+09
427   821153421864615936      8.211526e+17      1.132119e+08
498   813130366689148928      8.131273e+17      4.196984e+09
513   811647686436880384      8.116272e+17      4.196984e+09
565   802265048156610565      7.331095e+17      4.196984e+09
570   801854953262350336      8.018543e+17      1.185634e+07
576   800859414831898624      8.008580e+17      2.918590e+08
611   797165961484890113      7.971238e+17      2.916630e+07
...   ...
1479  693582294167244802      6.935722e+17      1.198989e+09
1497  692423280028966913      6.924173e+17      4.196984e+09
1501  692142790915014657      6.920419e+17      4.196984e+09

```

1523	690607260360429569	6.903413e+17	4.670367e+08
1598	686035780142297088	6.860340e+17	4.196984e+09
1605	685681090388975616	6.855479e+17	4.196984e+09
1618	684969860808454144	6.849598e+17	4.196984e+09
1630	684538444857667585	6.844811e+17	4.196984e+09
1634	684225744407494656	6.842229e+17	4.196984e+09
1663	682808988178739200	6.827884e+17	4.196984e+09
1689	681340665377193984	6.813394e+17	4.196984e+09
1774	678023323247357953	6.780211e+17	4.196984e+09
1819	676590572941893632	6.765883e+17	4.196984e+09
1842	675870721063669760	6.757073e+17	4.196984e+09
1844	675849018447167488	6.758457e+17	4.196984e+09
1852	675707330206547968	6.754971e+17	4.196984e+09
1866	675349384339542016	6.749998e+17	4.196984e+09
1882	674999807681908736	6.747934e+17	4.196984e+09
1885	674793399141146624	6.717299e+17	4.196984e+09
1892	674754018082705410	6.747522e+17	4.196984e+09
1895	674742531037511680	6.747400e+17	4.196984e+09
1905	674606911342424069	6.744689e+17	4.196984e+09
1914	674330906434379776	6.658147e+17	1.637468e+07
1940	673716320723169284	6.737159e+17	4.196984e+09
2036	671729906628341761	6.715610e+17	4.196984e+09
2038	671550332464455680	6.715449e+17	4.196984e+09
2149	669684865554620416	6.693544e+17	4.196984e+09
2169	669353438988365824	6.678065e+17	4.196984e+09
2189	668967877119254528	6.689207e+17	2.143566e+07
2298	667070482143944705	6.670655e+17	4.196984e+09

	timestamp \
30	2017-07-15 16:51:35 +0000
55	2017-07-02 21:58:53 +0000
64	2017-06-27 12:14:36 +0000
113	2017-06-02 19:38:25 +0000
148	2017-05-13 16:15:35 +0000
149	2017-05-12 17:12:53 +0000
179	2017-04-26 12:48:51 +0000
184	2017-04-24 15:13:52 +0000
186	2017-04-23 23:26:03 +0000
188	2017-04-22 19:15:32 +0000
189	2017-04-22 19:05:32 +0000
218	2017-04-07 13:04:55 +0000
228	2017-04-01 16:41:12 +0000
234	2017-03-31 01:11:22 +0000
251	2017-03-23 18:29:57 +0000
274	2017-03-11 22:59:09 +0000
290	2017-03-04 22:12:52 +0000
291	2017-03-04 17:56:49 +0000
313	2017-02-24 21:54:03 +0000

342 2017-02-16 04:45:50 +0000
 346 2017-02-15 18:03:45 +0000
 387 2017-02-01 01:11:25 +0000
 409 2017-01-23 00:56:15 +0000
 427 2017-01-17 00:33:26 +0000
 498 2016-12-25 21:12:41 +0000
 513 2016-12-21 19:01:02 +0000
 565 2016-11-25 21:37:47 +0000
 570 2016-11-24 18:28:13 +0000
 576 2016-11-22 00:32:18 +0000
 611 2016-11-11 19:55:50 +0000

 1479 2016-01-30 23:51:19 +0000
 1497 2016-01-27 19:05:49 +0000
 1501 2016-01-27 00:31:15 +0000
 1523 2016-01-22 18:49:36 +0000
 1598 2016-01-10 04:04:10 +0000
 1605 2016-01-09 04:34:45 +0000
 1618 2016-01-07 05:28:35 +0000
 1630 2016-01-06 00:54:18 +0000
 1634 2016-01-05 04:11:44 +0000
 1663 2016-01-01 06:22:03 +0000
 1689 2015-12-28 05:07:27 +0000
 1774 2015-12-19 01:25:31 +0000
 1819 2015-12-15 02:32:17 +0000
 1842 2015-12-13 02:51:51 +0000
 1844 2015-12-13 01:25:37 +0000
 1852 2015-12-12 16:02:36 +0000
 1866 2015-12-11 16:20:15 +0000
 1882 2015-12-10 17:11:09 +0000
 1885 2015-12-10 03:30:58 +0000
 1892 2015-12-10 00:54:28 +0000
 1895 2015-12-10 00:08:50 +0000
 1905 2015-12-09 15:09:55 +0000
 1914 2015-12-08 20:53:11 +0000
 1940 2015-12-07 04:11:02 +0000
 2036 2015-12-01 16:37:44 +0000
 2038 2015-12-01 04:44:10 +0000
 2149 2015-11-26 01:11:28 +0000
 2169 2015-11-25 03:14:30 +0000
 2189 2015-11-24 01:42:25 +0000
 2298 2015-11-18 20:02:51 +0000

source \
 30 <a href="http://twitter.com/download/iphone" r...
 55 <a href="http://twitter.com/download/iphone" r...
 64 <a href="http://twitter.com/download/iphone" r...
 113 <a href="http://twitter.com/download/iphone" r...

[illegible]

1905 <a href="http://twitter.com/download/iphone" r...
 1914 <a href="http://twitter.com/download/iphone" r...
 1940 <a href="http://twitter.com/download/iphone" r...
 2036 <a href="http://twitter.com/download/iphone" r...
 2038 <a href="http://twitter.com/download/iphone" r...
 2149 <a href="http://twitter.com/download/iphone" r...
 2169 <a href="http://twitter.com/download/iphone" r...
 2189 <a href="http://twitter.com/download/iphone" r...
 2298 <a href="http://twitter.com/download/iphone" r...

	text	retweeted_status_id \
30	@NonWhiteHat @MayhewMayhem omg hello tanner yo...	NaN
55	@roushfenway These are good dogs but 17/10 is ...	NaN
64	@RealKentMurphy 14/10 confirmed	NaN
113	@ComplicitOwl @ShopWeRateDogs >10/10 is res...	NaN
148	@Jack_Septic_Eye I'd need a few more pics to p...	NaN
149	Ladies and gentlemen... I found Pipsy. He may ...	NaN
179	@Marc_IRL pixelated af 12/10	NaN
184	THIS IS CHARLIE, MARK. HE DID JUST WANT TO SAY...	NaN
186	@xianmcguire @Jenna_Marbles Kardashians wouldn...	NaN
188	@dhmontgomery We also gave snoop dogg a 420/10...	NaN
189	@s8n You tried very hard to portray this good ...	NaN
218	@markhoppus MARK THAT DOG HAS SEEN AND EXPERIE...	NaN
228	Jerry just apuppologized to me. He said there ...	NaN
234	.@breaannanicolee PUPDATE: Cannon has a heart ...	NaN
251	PUPDATE: I'm proud to announce that Toby is 23...	NaN
274	@O_kelvin_0 >10/10 is reserved for puppos s...	NaN
290	@markhoppus 182/10	NaN
291	@bragg6of8 @Andy_Pace_ we are still looking fo...	NaN
313	@jonnyusun @Lin_Manuel ok jomny I know you're e...	NaN
342	@docmisterio account started on 11/15/15	NaN
346	@UNC can confirm 12/10	NaN
387	I was going to do 007/10, but the joke wasn't ...	NaN
409	@HistoryInPics 13/10	NaN
427	@imgur for a polar bear tho I'd say 13/10 is a...	NaN
498	I've been informed by multiple sources that th...	NaN
513	PUPDATE: I've been informed that Augie was act...	NaN
565	Like doggo, like pupper version 2. Both 11/10 ...	NaN
570	.@NBCSports OMG THE TINY HAT I'M GOING TO HAVE...	NaN
576	@SkyWilliams doggo simply protecting you from ...	NaN
611	@JODYHiGROLLER it may be an 11/10 but what do...	NaN
...
1479	Personally I'd give him an 11/10. Not sure why...	NaN
1497	PUPDATE: just noticed this dog has some extra ...	NaN
1501	These are some pictures of Teddy that further ...	NaN
1523	12/10 @LightningHoltt	NaN
1598	Yes I do realize a rating of 4/20 would've bee...	NaN
1605	Jack deserves another round of applause. If yo...	NaN

1618	For those who claim this is a goat, u are wron...	NaN
1630	After watching this video, we've determined th...	NaN
1634	Two sneaky puppers were not initially seen, mo...	NaN
1663	I'm aware that I could've said 20/16, but here...	NaN
1689	I've been told there's a slight possibility he...	NaN
1774	After getting lost in Reese's eyes for several...	NaN
1819	After some outrage from the crowd. Bubbles is ...	NaN
1842	& this is Yoshi. Another world record cont...	NaN
1844	This dog is being demoted to a 9/10 for not we...	NaN
1852	We've got ourselves a battle here. Watch out R...	NaN
1866	Yea I lied. Here's more. All 13/10 https://t.c...	NaN
1882	Ok last one of these. I may try to make some m...	NaN
1885	I have found another. 13/10 https://t.co/HwroP...	NaN
1892	Just received another perfect photo of dogs an...	NaN
1895	Some clarification is required. The dog is sin...	NaN
1905	The 13/10 also takes into account this impecca...	NaN
1914	13/10\n@ABC7	NaN
1940	The millennials have spoken and we've decided ...	NaN
2036	I'm just going to leave this one here as well...	NaN
2038	After 22 minutes of careful deliberation this ...	NaN
2149	After countless hours of research and hundreds...	NaN
2169	This is Tessa. She is also very pleased after ...	NaN
2189	12/10 good shit Bubka\n@wane15	NaN
2298	After much debate this dog is being upgraded t...	NaN

	retweeted_status_user_id	retweeted_status_timestamp	\
30	NaN	NaN	
55	NaN	NaN	
64	NaN	NaN	
113	NaN	NaN	
148	NaN	NaN	
149	NaN	NaN	
179	NaN	NaN	
184	NaN	NaN	
186	NaN	NaN	
188	NaN	NaN	
189	NaN	NaN	
218	NaN	NaN	
228	NaN	NaN	
234	NaN	NaN	
251	NaN	NaN	
274	NaN	NaN	
290	NaN	NaN	
291	NaN	NaN	
313	NaN	NaN	
342	NaN	NaN	
346	NaN	NaN	
387	NaN	NaN	

409	NaN	NaN
427	NaN	NaN
498	NaN	NaN
513	NaN	NaN
565	NaN	NaN
570	NaN	NaN
576	NaN	NaN
611	NaN	NaN
...
1479	NaN	NaN
1497	NaN	NaN
1501	NaN	NaN
1523	NaN	NaN
1598	NaN	NaN
1605	NaN	NaN
1618	NaN	NaN
1630	NaN	NaN
1634	NaN	NaN
1663	NaN	NaN
1689	NaN	NaN
1774	NaN	NaN
1819	NaN	NaN
1842	NaN	NaN
1844	NaN	NaN
1852	NaN	NaN
1866	NaN	NaN
1882	NaN	NaN
1885	NaN	NaN
1892	NaN	NaN
1895	NaN	NaN
1905	NaN	NaN
1914	NaN	NaN
1940	NaN	NaN
2036	NaN	NaN
2038	NaN	NaN
2149	NaN	NaN
2169	NaN	NaN
2189	NaN	NaN
2298	NaN	NaN

	expanded_urls	rating_numerator	\
30	NaN	12	
55	NaN	17	
64	NaN	14	
113	NaN	10	
148	NaN	12	
149	https://twitter.com/dog_rates/status/863079547...	14	
179	NaN	12	

184	https://twitter.com/dog_rates/status/856526610...	14
186	NaN	14
188	NaN	420
189	NaN	666
218	NaN	13
228	NaN	11
234	NaN	13
251	https://twitter.com/dog_rates/status/844979544...	13
274	NaN	10
290	NaN	182
291	NaN	15
313	NaN	960
342	NaN	11
346	NaN	12
387	NaN	7
409	NaN	13
427	NaN	13
498	NaN	12
513	NaN	11
565	https://twitter.com/dog_rates/status/802265048...	11
570	NaN	11
576	NaN	11
611	NaN	11
...
1479	NaN	11
1497	NaN	9
1501	https://twitter.com/dog_rates/status/692142790...	13
1523	NaN	12
1598	NaN	4
1605	NaN	14
1618	NaN	5
1630	https://twitter.com/dog_rates/status/684538444...	12
1634	https://twitter.com/dog_rates/status/684225744...	143
1663	NaN	20
1689	NaN	5
1774	NaN	13
1819	NaN	7
1842	https://twitter.com/dog_rates/status/675870721...	11
1844	NaN	9
1852	https://twitter.com/dog_rates/status/675707330...	11
1866	https://twitter.com/dog_rates/status/675349384...	13
1882	https://twitter.com/dog_rates/status/674999807...	13
1885	https://twitter.com/dog_rates/status/674793399...	13
1892	https://twitter.com/dog_rates/status/674754018...	12
1895	NaN	11
1905	NaN	13
1914	NaN	13
1940	NaN	1

2036	https://twitter.com/dog_rates/status/671729906...	13
2038	NaN	1
2149	NaN	11
2169	https://twitter.com/dog_rates/status/669353438...	10
2189	NaN	12
2298	NaN	10

	rating_denominator	name	doggo	floofer	pupper	puppo
30	10	None	None	None	None	None
55	10	None	None	None	None	None
64	10	None	None	None	None	None
113	10	None	None	None	None	None
148	10	None	None	None	None	None
149	10	None	None	None	None	None
179	10	None	None	None	None	None
184	10	None	None	None	None	None
186	10	None	None	None	None	None
188	10	None	None	None	None	None
189	10	None	None	None	None	None
218	10	None	None	None	None	None
228	10	None	None	None	None	None
234	10	None	None	None	None	None
251	10	None	None	None	None	None
274	10	None	None	None	None	None
290	10	None	None	None	None	None
291	10	None	None	None	None	None
313	0	None	None	None	None	None
342	15	None	None	None	None	None
346	10	None	None	None	None	None
387	10	None	None	None	None	None
409	10	None	None	None	None	None
427	10	None	None	None	None	None
498	10	None	None	None	None	None
513	10	None	None	None	None	None
565	10	None	doggo	None	pupper	None
570	10	None	None	None	None	None
576	10	None	doggo	None	None	None
611	10	None	None	None	None	None
...
1479	10	None	None	None	None	None
1497	10	None	None	None	None	None
1501	10	None	None	None	None	None
1523	10	None	None	None	None	None
1598	20	None	None	None	None	None
1605	10	None	None	None	None	None
1618	10	None	None	None	None	None
1630	10	None	None	None	None	None
1634	130	None	None	None	None	None

1663	16	None	None	None	None	None
1689	10	None	None	None	None	None
1774	10	None	None	None	None	None
1819	10	None	None	None	None	None
1842	10	None	None	None	None	None
1844	10	None	None	None	None	None
1852	10	None	None	None	None	None
1866	10	None	None	None	None	None
1882	10	None	None	None	None	None
1885	10	None	None	None	None	None
1892	10	None	None	None	None	None
1895	10	None	None	None	None	None
1905	10	None	None	None	None	None
1914	10	None	None	None	None	None
1940	10	None	None	None	None	None
2036	10	None	None	None	None	None
2038	10	None	None	None	None	None
2149	10	None	None	None	None	None
2169	10	Tessa	None	None	None	None
2189	10	None	None	None	None	None
2298	10	None	None	None	None	None

[78 rows x 17 columns]

In [10]: archive_df.query('floofer == "floofer"')

```
Out[10]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
46	883360690899218434	NaN	NaN	
200	854010172552949760	NaN	NaN	
582	800388270626521089	NaN	NaN	
774	776218204058357768	NaN	NaN	
984	749317047558017024	NaN	NaN	
1022	746542875601690625	NaN	NaN	
1091	737445876994609152	NaN	NaN	
1110	733822306246479872	NaN	NaN	
1534	689993469801164801	NaN	NaN	
1614	685307451701334016	NaN	NaN	

	timestamp	\
46	2017-07-07 16:22:55 +0000	
200	2017-04-17 16:34:26 +0000	
582	2016-11-20 17:20:08 +0000	
774	2016-09-15 00:36:55 +0000	
984	2016-07-02 19:01:20 +0000	
1022	2016-06-25 03:17:46 +0000	
1091	2016-05-31 00:49:32 +0000	
1110	2016-05-21 00:50:46 +0000	
1534	2016-01-21 02:10:37 +0000	

1614 2016-01-08 03:50:03 +0000

	source \		text	retweeted_status_id \
46	<a href="http://twitter.com/download/iphone" r...		Meet Grizzwald. He may be the floofiest floofe...	NaN
200	<a href="http://twitter.com/download/iphone" r...		At first I thought this was a shy doggo, but i...	NaN
582	<a href="http://twitter.com/download/iphone" r...		This is Doc. He takes time out of every day to...	NaN
774	<a href="http://twitter.com/download/iphone" r...		Atlas rolled around in some chalk and now he's...	NaN
984	<a href="http://twitter.com/download/iphone" r...		This is Blu. He's a wild bush Floofer. I wish ...	NaN
1022	Vine -...		Here's a golden floofer helping with the groce...	NaN
1091	<a href="http://twitter.com/download/iphone" r...		Just wanted to share this super rare Rainbow F...	NaN
1110	<a href="http://twitter.com/download/iphone" r...		This is Moose. He's a Polynesian Floofer. Dapp...	NaN
1534	Vine -...		Here we are witnessing a rare High Stepping Al...	NaN
1614	<a href="http://twitter.com/download/iphone" r...		Say hello to Petrick. He's an Altostratus Floo...	NaN

	retweeted_status_user_id	retweeted_status_timestamp \
46	NaN	NaN
200	NaN	NaN
582	NaN	NaN
774	NaN	NaN
984	NaN	NaN
1022	NaN	NaN
1091	NaN	NaN
1110	NaN	NaN
1534	NaN	NaN
1614	NaN	NaN

	expanded_urls	rating_numerator \
46	https://twitter.com/dog_rates/status/883360690...	13
200	https://twitter.com/dog_rates/status/854010172...	11
582	https://twitter.com/dog_rates/status/800388270...	12
774	https://twitter.com/dog_rates/status/776218204...	13
984	https://twitter.com/dog_rates/status/749317047...	12
1022	https://vine.co/v/5uZYwqmuDeT	11
1091	https://twitter.com/dog_rates/status/737445876...	13
1110	https://twitter.com/dog_rates/status/733822306...	10
1534	https://vine.co/v/ienexVMZgi5	12

1614 https://twitter.com/dog_rates/status/685307451...

11

	rating_denominator	name	doggo	floofer	pupper	puppo
46	10	Grizzwald	None	floofer	None	None
200	10	None	doggo	floofer	None	None
582	10	Doc	None	floofer	None	None
774	10	None	None	floofer	None	None
984	10	Blu	None	floofer	None	None
1022	10	None	None	floofer	None	None
1091	10	None	None	floofer	None	None
1110	10	Moose	None	floofer	None	None
1534	10	None	None	floofer	None	None
1614	10	Petrick	None	floofer	None	None

```
In [11]: pd.set_option("display.max_colwidth", 1000)
```

```
In [12]: print(archive_df.query('tweet_id == 892420643555336193')['expanded_urls'])
```

```
0 https://twitter.com/dog_rates/status/892420643555336193/photo/1
Name: expanded_urls, dtype: object
```

```
In [13]: archive_df['tweet_id'].duplicated().sum()
```

```
Out[13]: 0
```

```
In [14]: archive_df['doggo'].unique()
```

```
Out[14]: array(['None', 'doggo'], dtype=object)
```

```
In [15]: image_preds.head()
```

```
Out[15]:
```

	tweet_id	jpg_url \
0	666020888022790149	https://pbs.twimg.com/media/CT4udnOWwAA0aMy.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 [16]: image_preds.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2075 entries, 0 to 2074
Data columns (total 12 columns):
tweet_id    2075 non-null int64
jpg_url     2075 non-null object
img_num     2075 non-null int64
p1          2075 non-null object
p1_conf     2075 non-null float64
p1_dog      2075 non-null bool
p2          2075 non-null object
p2_conf     2075 non-null float64
p2_dog      2075 non-null bool
p3          2075 non-null object
p3_conf     2075 non-null float64
p3_dog      2075 non-null bool
dtypes: bool(3), float64(3), int64(2), object(4)
memory usage: 152.1+ KB

In [17]: image_preds.describe()

Out[17]:
```

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

```

In [18]: image_preds['tweet_id'].duplicated().sum()

Out[18]: 0

In [19]: df = pd.read_json('tweet_json.txt', lines = True)
df.head()

Out[19]:
```

	Likes	Retweets	tweet_id
0	33808	7009	892420643555336192
1	29330	5301	892177421306343424
2	22053	3481	891815181378084864
3	36938	7225	891689557279858688
4	35309	7760	891327558926688256

```

In [20]: df.shape

Out[20]: (2327, 3)

In [21]: len(archive_df['tweet_id'])-len(df['tweet_id'])

Out[21]: 29

```


1.2.1 Quality issues

1. Some tweets have repeated links in the expanded_urls field
2. Tweet_id, image number is an integer, Retweeted_status_id, retweeted_status_user_id, in_reply_to_status_id, in_reply_to_user_id, ratings numerator & denominator are float, timestamp is an object
3. Source column in archive_df contains html anchor tag.
4. Separate timestamp column into various date based columns i.e year, month, day.
5. The column names in images predictions aren't descriptive i.e p1, p1conf, p1_dog
6. Some tweets are retweets and not original ratings
7. Some Predicted dog breed names in predictions contains hyphens.
8. Drop unused columns

1.2.2 Tidiness issues

1. doggo, floofer, pupper, puppo should be in a single column dog stage.
2. The archive tweets, image predictions and additional tweet data tables should be combined into one for this project

1.3 Cleaning Data

In this section, clean **all** of the issues you documented while assessing.

Note: Make a copy of the original data before cleaning. Cleaning includes merging individual pieces of data according to the rules of [tidy data](#). The result should be a high-quality and tidy master pandas DataFrame (or DataFrames, if appropriate).

```
In [22]: # Make copies of original pieces of data
         archive_copy = archive_df.copy()
         image_pred_copy = image_preds.copy()
         df_copy = df.copy()
```

1.3.1 Issue #1: Combine the three dataframes into one

Define: Merge the archive, image predictions and additional data columns

Code

```
In [23]: combined_1 = pd.merge(df_copy, archive_df, left_on = 'tweet_id', right_on = 'tweet_id',

                                # Join combined_1 with image_pred_copy
                                combined = pd.merge(combined_1, image_pred_copy, left_on = 'tweet_id', right_on = 'tweet_id',
```

Test

```
In [24]: combined.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1339 entries, 0 to 1338
Data columns (total 30 columns):
Likes                1339 non-null int64
Retweets             1339 non-null int64
tweet_id             1339 non-null int64
in_reply_to_status_id  15 non-null float64
in_reply_to_user_id   15 non-null float64
timestamp            1339 non-null object
source               1339 non-null object
text                 1339 non-null object
retweeted_status_id    43 non-null float64
retweeted_status_user_id 43 non-null float64
retweeted_status_timestamp 43 non-null object
expanded_urls         1339 non-null object
rating_numerator       1339 non-null float64
rating_denominator     1339 non-null float64
name                  1339 non-null object
doggo                 1339 non-null object
floofer               1339 non-null object
pupper                1339 non-null object
puppo                 1339 non-null object
jpg_url               1339 non-null object
img_num               1339 non-null int64
p1                     1339 non-null object
p1_conf               1339 non-null float64
p1_dog                 1339 non-null bool
p2                     1339 non-null object
p2_conf               1339 non-null float64
p2_dog                 1339 non-null bool
p3                     1339 non-null object
p3_conf               1339 non-null float64
p3_dog                 1339 non-null bool
dtypes: bool(3), float64(9), int64(4), object(14)
memory usage: 296.8+ KB
```

1.3.2 Issue #2: doggo, floofer, pupper, puppo should be in a single column dog stage

Define: Create and merge dog stages into one column

Code:

```
In [25]: combined['dog_stages'] = combined['text'].str.extract('(doggo|floofer|Floofer|pupper|pu
combined['dog_stages'] = combined['dog_stages'].str.lower()
```

Test:

```
In [26]: combined['dog_stages'].unique()
```

```
Out[26]: array([nan, 'pupper', 'puppo', 'doggo', 'floofer'], dtype=object)
```

1.3.3 Issue #3: Some tweets have repeated links in the archive_df expanded_urls field

Define: Identify rows where there are multiple links in the expanded_urls column, split on delimiter then keep one

Code

```
In [27]: # Find instance where url contains ','
combined["indexes"] = combined['expanded_urls'].str.find(',')
# fill null values as -1 to represent string not found
combined["indexes"].fillna(-1,inplace = True)
```

```
In [28]: # View rows with multiple url
combined.query('indexes != -1')['expanded_urls']
```

```
Out[28]: 2
4
6
7
10      https://twitter.com/dog_rates/status/888554962724278272/photo/1,https://twi
11
16
17
19
22      https://twitter.com/dog_rates/status/830583320585068544/photo/1,https://twi
23      https://twitter.com/dog_rates/status/885167619883638784/photo/1,https://twi
26
27
28
31
35      https://twitter.com/dog_rates/status/880465832366813184/photo/1,https://twi
36
37
41
42
43
44      https://twitter.com/rachel2195/status/876850772322988033/photo/1,https://twitte
46
47
52
56
57
58
```

```

59      https://twitter.com/dog_rates/status/872820683541237760/photo/1,https://twi
67
875
907      https://twi
914      https://twi
916      https://twi
920      https://twi
942
952
956
983
988
999      https://twi
1002     https://twitter.com/dog_rates/status/675349384339542016/photo/1,https://twi
1003
1021
1022
1031
1054
1056
1068     https://twitter.com/dog_rates/status/673320132811366400/photo/1,https://twi
1069
1107
1110
1114     https://twitter.com/dog_rates/status/671735591348891648/photo/1,https://twi
1116
1127     https://twitter.com/dog_rates/status/671357843010908160/photo/1,https://twi
1129
1139      https://twi
1149      https://twi
1235     https://twitter.com/dog_rates/status/668623201287675904/photo/1,https://twi
1273
Name: expanded_urls, Length: 346, dtype: object

```

```

In [29]: # For rows whose indexes isn't '-1' i.e contains ',', split by delimiter then keep the
combined.loc[combined['indexes'] != -1, 'expanded_urls'] = combined.query('indexes !=

```

Test

```

In [30]: # View rows with multiple url
combined.query('indexes != -1')['expanded_urls']

```

```

Out[30]: 2      https://twitter.com/dog_rates/status/891327558926688256/photo/1
4      https://twitter.com/dog_rates/status/890729181411237888/photo/1
6      https://twitter.com/dog_rates/status/890006608113172480/photo/1
7      https://twitter.com/dog_rates/status/889638837579907072/photo/1
10     https://twitter.com/dog_rates/status/888554962724278272/photo/1

```

11 https://twitter.com/dog_rates/status/888078434458587136/photo/1
16 https://twitter.com/dog_rates/status/886983233522544640/photo/1
17 https://twitter.com/dog_rates/status/886736880519319552/photo/1
19 https://twitter.com/dog_rates/status/886366144734445568/photo/1
22 https://twitter.com/dog_rates/status/830583320585068544/photo/1
23 https://twitter.com/dog_rates/status/885167619883638784/photo/1
26 https://twitter.com/dog_rates/status/883482846933004288/photo/1
27 https://twitter.com/dog_rates/status/883117836046086144/photo/1
28 https://twitter.com/dog_rates/status/882992080364220416/photo/1
31 https://twitter.com/dog_rates/status/882268110199369728/photo/1
35 https://twitter.com/dog_rates/status/880465832366813184/photo/1
36 https://twitter.com/dog_rates/status/880221127280381952/photo/1
37 https://twitter.com/dog_rates/status/879862464715927552/photo/1
41 https://twitter.com/dog_rates/status/878281511006478336/photo/1
42 https://twitter.com/dog_rates/status/878057613040115712/photo/1
43 https://twitter.com/dog_rates/status/877736472329191424/photo/1
44 <https://twitter.com/rachel2195/status/876850772322988033/photo/1>
46 https://twitter.com/dog_rates/status/877201837425926144/photo/1
47 https://twitter.com/dog_rates/status/876838120628539392/photo/1
52 https://twitter.com/dog_rates/status/875021211251597312/photo/1
56 https://twitter.com/dog_rates/status/874012996292530176/photo/1
57 https://twitter.com/dog_rates/status/873213775632977920/photo/1
58 https://twitter.com/dog_rates/status/872967104147763200/photo/1
59 https://twitter.com/dog_rates/status/872820683541237760/photo/1
67 https://twitter.com/dog_rates/status/868552278524837888/photo/1
...
875 https://twitter.com/dog_rates/status/684225744407494656/photo/1
907 https://twitter.com/dog_rates/status/680836378243002368/photo/1
914 https://twitter.com/dog_rates/status/680145970311643136/photo/1
916 https://twitter.com/dog_rates/status/680085611152338944/photo/1
920 https://twitter.com/dog_rates/status/679828447187857408/photo/1
942 https://twitter.com/dog_rates/status/678396796259975168/photo/1
952 https://twitter.com/dog_rates/status/677573743309385728/photo/1
956 https://twitter.com/dog_rates/status/677334615166730240/photo/1
983 https://twitter.com/dog_rates/status/675853064436391936/photo/1
988 https://twitter.com/dog_rates/status/675710890956750848/photo/1
999 https://twitter.com/dog_rates/status/675432746517426176/photo/1
1002 https://twitter.com/dog_rates/status/675349384339542016/photo/1
1003 https://twitter.com/dog_rates/status/675334060156301312/photo/1
1021 https://twitter.com/dog_rates/status/674764817387900928/photo/1
1022 https://twitter.com/dog_rates/status/674752233200820224/photo/1
1031 https://twitter.com/dog_rates/status/674468880899788800/photo/1
1054 https://twitter.com/dog_rates/status/673707060090052608/photo/1
1056 https://twitter.com/dog_rates/status/673697980713705472/photo/1
1068 https://twitter.com/dog_rates/status/673320132811366400/photo/1
1069 https://twitter.com/dog_rates/status/673317986296586240/photo/1
1107 https://twitter.com/dog_rates/status/671874878652489728/photo/1
1110 https://twitter.com/dog_rates/status/671768281401958400/photo/1

```

1114         https://twitter.com/dog_rates/status/671735591348891648/photo/1
1116         https://twitter.com/dog_rates/status/671547767500775424/photo/1
1127         https://twitter.com/dog_rates/status/671357843010908160/photo/1
1129         https://twitter.com/dog_rates/status/671347597085433856/photo/1
1139         https://twitter.com/dog_rates/status/670995969505435648/photo/1
1149         https://twitter.com/dog_rates/status/670807719151067136/photo/1
1235         https://twitter.com/dog_rates/status/668623201287675904/photo/1
1273     https://twitter.com/dogratingrating/status/667548415174144001/photo/1
Name: expanded_urls, Length: 346, dtype: object

```

1.3.4 Issue #4: Convert columns to an appropriate datatype

Define: Convert columns to correct datatypes

Code

```

In [31]: combined['in_reply_to_status_id'] = combined['in_reply_to_status_id'].astype(str)
combined['in_reply_to_user_id'] = combined['in_reply_to_user_id'].astype(str)
combined['tweet_id'] = combined['tweet_id'].astype(str)
combined['timestamp'] = pd.to_datetime(combined['timestamp'])
combined['source'] = combined['source'].astype('category')
combined['img_num'] = combined['img_num'].astype('category')
combined['dog_stages'] = combined['dog_stages'].astype('object')
combined['rating_numerator'] = combined['rating_numerator'].astype(int)
combined['rating_denominator'] = combined['rating_denominator'].astype(int)

```

Test

```

In [32]: combined.dtypes

```

```

Out[32]: Likes                int64
Retweets                    int64
tweet_id                   object
in_reply_to_status_id      object
in_reply_to_user_id        object
timestamp                  datetime64[ns]
source                     category
text                      object
retweeted_status_id        float64
retweeted_status_user_id   float64
retweeted_status_timestamp object
expanded_urls              object
rating_numerator           int64
rating_denominator         int64
name                      object
doggo                     object
floofer                   object
pupper                    object

```

```

puppo                object
jpg_url              object
img_num              category
p1                   object
p1_conf              float64
p1_dog               bool
p2                   object
p2_conf              float64
p2_dog               bool
p3                   object
p3_conf              float64
p3_dog               bool
dog_stages            object
indexes              int64
dtype: object

```

1.3.5 Issue #5: Source column in archive_df contains html anchor tag.

Define: Remove anchor tag from source column

Code

```

In [33]: href_tags = re.compile(r'<[^>]+>')

def remove_tags(text):
    return href_tags.sub('', text)

combined['source'] = combined['source'].apply(remove_tags)

```

Test

```
In [34]: combined.head()
```

```

Out[34]:   Likes  Retweets  tweet_id  in_reply_to_status_id \
0   22053    3481  891815181378084864             nan
1   36938    7225  891689557279858688             nan
2   35309    7760  891327558926688256             nan
3   17812    2602  891087950875897856             nan
4   56865   15753  890729181411237888             nan

   in_reply_to_user_id  timestamp  source \
0             nan  2017-07-31 00:18:03  Twitter for iPhone
1             nan  2017-07-30 15:58:51  Twitter for iPhone
2             nan  2017-07-29 16:00:24  Twitter for iPhone
3             nan  2017-07-29 00:08:17  Twitter for iPhone
4             nan  2017-07-28 00:22:40  Twitter for iPhone

```

```

0           This is Archie. He is a rare Norwegian Pouncing Corgo. Lives in the
1                                           This is Darla. She commen
2 This is Franklin. He would like you to stop calling him "cute." He is a very fierce
3 Here we have a majestic great white breaching off South Africa's coast. Absolutely h
4           When you watch your owner call another dog a good boy but then t

    retweeted_status_id  retweeted_status_user_id  ...  p1_conf  p1_dog  \
0                NaN                NaN  ...   0.716012   True
1                NaN                NaN  ...   0.170278  False
2                NaN                NaN  ...   0.555712   True
3                NaN                NaN  ...   0.425595   True
4                NaN                NaN  ...   0.566142   True

           p2  p2_conf  p2_dog           p3  p3_conf  \
0      malamute  0.078253   True      kelpie  0.031379
1  Labrador_retriever  0.168086   True      spatula  0.040836
2   English_springer  0.225770   True  German_short-haired_pointer  0.175219
3    Irish_terrier  0.116317   True      Indian_elephant  0.076902
4     Eskimo_dog  0.178406   True      Pembroke  0.076507

    p3_dog  dog_stages  indexes
0   True      NaN      -1
1  False      NaN      -1
2   True      NaN      63
3  False      NaN      -1
4   True      NaN      63

[5 rows x 32 columns]

```

1.3.6 Issue #6: Seperate timestamp column into various date based columns i.e year, month, day

Define: Extract year, month and day to new columns

Code

```

In [35]: # Extract day, month, year values from timestamp column
combined['day'] = combined['timestamp'].dt.day
combined['month'] = combined['timestamp'].dt.month
combined['year'] = combined['timestamp'].dt.year

```

Test

```

In [36]: combined.head()

```

```

Out[36]:    Likes  Retweets  tweet_id  in_reply_to_status_id  \
0   22053      3481  891815181378084864                nan
1   36938      7225  891689557279858688                nan

```


2	35309	7760	891327558926688256	nan
3	17812	2602	891087950875897856	nan
4	56865	15753	890729181411237888	nan

	in_reply_to_user_id	timestamp	source	\
0	nan	2017-07-31 00:18:03	Twitter for iPhone	
1	nan	2017-07-30 15:58:51	Twitter for iPhone	
2	nan	2017-07-29 16:00:24	Twitter for iPhone	
3	nan	2017-07-29 00:08:17	Twitter for iPhone	
4	nan	2017-07-28 00:22:40	Twitter for iPhone	

0	This is Archie. He is a rare Norwegian Pouncing Corgo. Lives in the
1	This is Darla. She commen
2	This is Franklin. He would like you to stop calling him "cute." He is a very fierce
3	Here we have a majestic great white breaching off South Africa's coast. Absolutely h
4	When you watch your owner call another dog a good boy but then t

	retweeted_status_id	retweeted_status_user_id	...	p2_conf	p2_dog	\
0	NaN	NaN	...	0.078253	True	
1	NaN	NaN	...	0.168086	True	
2	NaN	NaN	...	0.225770	True	
3	NaN	NaN	...	0.116317	True	
4	NaN	NaN	...	0.178406	True	

	p3	p3_conf	p3_dog	dog_stages	indexes	day	month	\
0	kelpie	0.031379	True	NaN	-1	31	7	
1	spatula	0.040836	False	NaN	-1	30	7	
2	German_short-haired_pointer	0.175219	True	NaN	63	29	7	
3	Indian_elephant	0.076902	False	NaN	-1	29	7	
4	Pembroke	0.076507	True	NaN	63	28	7	

	year
0	2017
1	2017
2	2017
3	2017
4	2017

[5 rows x 35 columns]

1.3.7 Issue #7: The column names in images predictions aren't descriptive i.e p1, p1conf, p1_dog

Define: Rename non descriptive prediction columns

Code

```
In [37]: combined.rename(columns={'p1':'breed','p1_conf':'confidence','p1_dog':'is_dog'},inplace=True)
```

Test

```
In [38]: combined.columns
```

```
Out[38]: Index(['Likes', 'Retweets', 'tweet_id', 'in_reply_to_status_id',  
               'in_reply_to_user_id', 'timestamp', 'source', 'text',  
               'retweeted_status_id', 'retweeted_status_user_id',  
               'retweeted_status_timestamp', 'expanded_urls', 'rating_numerator',  
               'rating_denominator', 'name', 'doggo', 'floofer', 'pupper', 'puppo',  
               'jpg_url', 'img_num', 'breed', 'confidence', 'is_dog', 'p2', 'p2_conf',  
               'p2_dog', 'p3', 'p3_conf', 'p3_dog', 'dog_stages', 'indexes', 'day',  
               'month', 'year'],  
              dtype='object')
```

1.3.8 Issue #8: Some tweets are retweets and not original ratings

Define: Identify text values that start with RT and remove them

Code

```
In [39]: # identify retweets  
combined.loc[combined['text'].str.startswith('RT') == True]
```

```
Out[39]:
```

	Likes	Retweets	tweet_id	in_reply_to_status_id	\
22	0	15438	885311592912609280	nan	
44	0	70	877611172832227328	nan	
82	0	679	860924035999428608	nan	
118	0	396	847971574464610304	nan	
137	0	31	838916489579200512	nan	
154	0	8838	832040443403784192	nan	
178	0	5105	824796380199809024	nan	
188	0	3127	821813639212650496	nan	
197	0	34548	819015337530290176	nan	
200	0	5698	818588835076603904	nan	
204	0	7873	817181837579653120	nan	
208	0	4391	816829038950027264	nan	
212	0	4883	816014286006976512	nan	
239	0	4583	809808892968534016	nan	
243	0	5524	808134635716833280	nan	
247	0	6891	807059379405148160	nan	
250	0	10889	806242860592926720	nan	
258	0	6932	803692223237865472	nan	
276	0	4643	798694562394996736	nan	
277	0	5227	798673117451325440	nan	
278	0	1867	798628517273620480	nan	
279	0	3142	798340744599797760	nan	
286	0	13384	796177847564038144	nan	

289	0	3160	794983741416415232	nan
293	0	2930	793614319594401792	nan
306	0	3818	791026214425268224	nan
308	0	2146	790723298204217344	nan
318	0	3216	788070120937619456	nan
327	0	6505	786036967502913536	nan
336	0	5148	783347506784731136	nan
342	0	5741	782021823840026624	nan
351	0	3425	780496263422808064	nan
358	0	11345	778396591732486144	nan
365	0	3923	777641927919427584	nan
367	0	12610	776819012571455488	nan
383	0	3119	772615324260794368	nan
407	0	2424	766078092750233600	nan
420	0	3590	761750502866649088	nan
444	0	278	757597904299253760	nan
454	0	7251	754874841593970688	nan
469	0	14906	752309394570878976	nan
641	0	122	711998809858043904	nan
997	1156	528	675489971617296384	nan
1273	0	26	667550882905632768	nan

	in_reply_to_user_id	timestamp	source \
22	nan	2017-07-13 01:35:06	Twitter for iPhone
44	nan	2017-06-21 19:36:23	Twitter for iPhone
82	nan	2017-05-06 18:27:40	Twitter for iPhone
118	nan	2017-04-01 00:39:12	Twitter for iPhone
137	nan	2017-03-07 00:57:32	Twitter for iPhone
154	nan	2017-02-16 01:34:34	Twitter for iPhone
178	nan	2017-01-27 01:49:15	Twitter for iPhone
188	nan	2017-01-18 20:16:54	Twitter for iPhone
197	nan	2017-01-11 02:57:27	Twitter for iPhone
200	nan	2017-01-09 22:42:41	Twitter for iPhone
204	nan	2017-01-06 01:31:47	Twitter for iPhone
208	nan	2017-01-05 02:09:53	Twitter for iPhone
212	nan	2017-01-02 20:12:21	Twitter for iPhone
239	nan	2016-12-16 17:14:20	Twitter for iPhone
243	nan	2016-12-12 02:21:26	Twitter for iPhone
247	nan	2016-12-09 03:08:45	Twitter for iPhone
250	nan	2016-12-06 21:04:11	Twitter for iPhone
258	nan	2016-11-29 20:08:52	Twitter for iPhone
276	nan	2016-11-16 01:09:57	Twitter for iPhone
277	nan	2016-11-15 23:44:44	Twitter for iPhone
278	nan	2016-11-15 20:47:30	Twitter for iPhone
279	nan	2016-11-15 01:44:00	Twitter for iPhone
286	nan	2016-11-09 02:29:25	Twitter for iPhone
289	nan	2016-11-05 19:24:28	Twitter for iPhone
293	nan	2016-11-02 00:42:53	Twitter for iPhone

306 nan 2016-10-25 21:18:40 Twitter for iPhone
 308 nan 2016-10-25 01:14:59 Twitter for iPhone
 318 nan 2016-10-17 17:32:13 Twitter for iPhone
 327 nan 2016-10-12 02:53:11 Twitter for iPhone
 336 nan 2016-10-04 16:46:14 Twitter for iPhone
 342 nan 2016-10-01 00:58:26 Twitter for iPhone
 351 nan 2016-09-26 19:56:24 Twitter for iPhone
 358 nan 2016-09-21 00:53:04 Twitter for iPhone
 365 nan 2016-09-18 22:54:18 Twitter for iPhone
 367 nan 2016-09-16 16:24:19 Twitter for iPhone
 383 nan 2016-09-05 02:00:22 Twitter for iPhone
 407 nan 2016-08-18 01:03:45 Twitter for iPhone
 420 nan 2016-08-06 02:27:27 Twitter for iPhone
 444 nan 2016-07-25 15:26:30 Twitter for iPhone
 454 nan 2016-07-18 03:06:01 Twitter for iPhone
 469 nan 2016-07-11 01:11:51 Twitter for iPhone
 641 nan 2016-03-21 19:31:59 Twitter for iPhone
 997 nan 2015-12-12 01:38:53 Twitter for iPhone
 1273 nan 2015-11-20 03:51:47 Twitter Web Client

22 RT @dog_rates: This is Lilly. She just parallel barked. Kindly requests a
 44 RT @rachel2195: @dog_rates the boyfriend and his soaking wet pu
 82 RT @tallylott: h*ckin a
 118 RT @basic_vacek_: I lo
 137 RT @KibaDva: I collected all the goo
 154 RT @dog_rates: This is Klein. These pics were taken a month apart. He knows he's
 178 RT @dog_rates: This is Bailey. She loves going down slides
 188 RT @dog_rates: Meet Hercules. He can have whatever he wants for the rest of eter
 197 RT @dog_rates: This is Bo. He was a very good First Doggo. 14/1
 200 RT @dog_rates: This is Chelsea. She forgot how t
 204 RT @dog_rates: Here's a pupper with s
 208 RT @dog_rates: This is Betty. She's assisting with the dishes. Such a
 212 RT @dog_rates: This is Larry. He has no self contr
 239 RT @dog_rates: This is Maximus. His face is stuck like that. Tragic really. Great
 243 RT @dog_rates: This is Milo. I would
 247 RT @dog_rates: This is Cali. She arrived preassembled. Convenient af. 12/10 a
 250 RT @dog_rates: This is Dave. He's currently in a predicament. Doesn't seem to
 258 RT @dog_rates: I present to you... Dog Jesus. 13/10 (he could b
 276 RT @dog_rates: I'm not sure what's happening here, but it's
 277 RT @dog_rates: I shall call him squishy and he shall be mine
 278 RT @dog_rates: This a Norwegian Pewterschmidt named Tickles. Ears for da
 279 RT @dog_rates: This is Davey. He'll have your daughter home by 8. Just a stand u
 286 RT @dog_rates: This is Ruby. She just turned on the news. Officially
 289 RT @dog_rates: This is Rizzy. Sh
 293 RT @dog_rates: When she says you're a good boy and you know you're a good b
 306 RT @dog_rates: This is Alfie. He's touching
 308 RT @dog_rates: This is Happy. He's a bathtub reviewer. Seems

318 RT @dog_rates: This is Bo and Ty. Bo eats paper a
 327 RT @dog_rates: This is Scout. He really wants to kiss himself. H*ckin i
 336 RT @dog_rates: This is Kenny. He just wants to b
 342 RT @dog_rates: This is Harper. She scraped her elbow attempting a backflip of
 351 RT @dog_rates: This is Bell. She likes holding hands. 12/10 w
 358 RT @dog_rates: This is an East African Chalupa Seal. We only rate dogs. Please on
 365 RT @dog_rates: This is Arnie. He's a Nova S
 367 RT @dog_rates: Everybody
 383 RT @dog_rates: This is Gromit. He's pupset because there's no need to beware
 407 RT @dog_rates: This is Colby. He's currently regretting all those times he shook
 420 RT @dog_rates: "Tristan do not speak to me with that kind of tone o
 444 RT @jon_hill987: @dog_rates There is a cunningly disguis
 454 RT @dog_rates: This is
 469 RT @dog_rates:
 641 RT @twitter: @dog_rates Awesome Tweet!
 997 RT until we find this dog. Clearly a cool dog (front leg relaxed out window).
 1273 RT @dogratingrating: Unoriginal idea. Blatant

	retweeted_status_id	retweeted_status_user_id	...	p2_conf	p2_dog	\
22	8.305833e+17	4.196984e+09	...	0.057091	False	
44	8.768508e+17	5.128045e+08	...	0.202907	True	
82	8.609145e+17	3.638908e+08	...	0.012591	False	
118	8.479710e+17	5.970642e+08	...	0.273392	False	
137	8.389060e+17	8.117408e+08	...	0.001406	False	
154	7.699404e+17	4.196984e+09	...	0.155413	True	
178	7.950767e+17	4.196984e+09	...	0.049995	False	
188	7.806013e+17	4.196984e+09	...	0.003044	True	
197	8.190048e+17	4.196984e+09	...	0.271929	True	
200	7.735476e+17	4.196984e+09	...	0.137187	True	
204	8.159661e+17	4.196984e+09	...	0.295690	True	
208	7.909461e+17	4.196984e+09	...	0.245773	True	
212	7.320056e+17	4.196984e+09	...	0.052724	True	
239	7.939622e+17	4.196984e+09	...	0.044462	True	
243	8.011679e+17	4.196984e+09	...	0.061604	True	
247	7.829691e+17	4.196984e+09	...	0.171393	True	
250	7.833346e+17	4.196984e+09	...	0.130611	True	
258	6.914169e+17	4.196984e+09	...	0.197314	True	
276	7.012147e+17	4.196984e+09	...	0.159509	True	
277	6.755011e+17	4.196984e+09	...	0.027907	False	
278	6.675094e+17	4.196984e+09	...	0.119256	True	
279	7.717705e+17	4.196984e+09	...	0.192031	True	
286	7.961497e+17	4.196984e+09	...	0.140798	True	
289	7.895309e+17	4.196984e+09	...	0.197021	True	
293	7.916723e+17	4.196984e+09	...	0.219721	True	
306	7.638376e+17	4.196984e+09	...	0.069362	False	
308	7.899865e+17	4.196984e+09	...	0.325106	False	
318	7.610045e+17	4.196984e+09	...	0.064897	True	
327	7.798343e+17	4.196984e+09	...	0.003143	True	

336	6.742918e+17	4.196984e+09	...	0.368566	True
342	7.076109e+17	4.196984e+09	...	0.165930	True
351	7.424232e+17	4.196984e+09	...	0.001186	True
358	7.030419e+17	4.196984e+09	...	0.152445	False
365	7.504293e+17	4.196984e+09	...	0.011584	True
367	6.798284e+17	4.196984e+09	...	0.166246	True
383	7.652221e+17	4.196984e+09	...	0.151047	True
407	7.258423e+17	4.196984e+09	...	0.132640	True
420	6.853251e+17	4.196984e+09	...	0.398260	True
444	7.575971e+17	2.804798e+08	...	0.056627	False
454	6.791584e+17	4.196984e+09	...	0.251530	True
469	6.753544e+17	4.196984e+09	...	0.181351	True
641	7.119983e+17	7.832140e+05	...	0.059895	True
997	NaN	NaN	...	0.118647	False
1273	6.675484e+17	4.296832e+09	...	0.000201	False

	p3	p3_conf	p3_dog	dog_stages	indexes	day	\
22	pug	0.011933	True	NaN	63	13	
44	Irish_terrier	0.107473	True	pupper	64	21	
82	paper_towel	0.011178	False	NaN	63	6	
118	toilet_tissue	0.066656	False	NaN	66	1	
137	envelope	0.001093	False	NaN	61	7	
154	Staffordshire_bullterrier	0.030943	True	NaN	63	16	
178	swing	0.044660	False	NaN	63	27	
188	English_springer	0.001050	True	NaN	63	18	
197	Tibetan_terrier	0.094759	True	NaN	63	11	
200	malamute	0.071436	True	pupper	63	9	
204	otterhound	0.036251	True	pupper	63	6	
208	chow	0.039012	True	puppo	63	5	
212	cocker_spaniel	0.048572	True	NaN	63	2	
239	Staffordshire_bullterrier	0.016497	True	NaN	63	16	
243	English_setter	0.041331	True	NaN	63	12	
247	Labrador_retriever	0.110592	True	NaN	63	9	
250	Pembroke	0.100842	True	NaN	63	6	
258	Airedale	0.082515	True	NaN	63	29	
276	basenji	0.084466	True	NaN	63	16	
277	French_loaf	0.018189	False	NaN	63	15	
278	golden_retriever	0.082549	True	NaN	63	15	
279	Border_collie	0.121626	True	NaN	63	15	
286	seat_belt	0.087355	False	NaN	63	9	
289	Norwegian_elkhound	0.151024	True	NaN	63	5	
293	kuvasz	0.015965	True	NaN	63	2	
306	keeshond	0.050528	True	NaN	63	25	
308	golden_retriever	0.078530	True	NaN	63	25	
318	Labrador_retriever	0.047704	True	NaN	63	17	
327	Great_Pyrenees	0.000917	True	NaN	63	12	
336	Chihuahua	0.003330	True	NaN	63	4	
342	Chesapeake_Bay_retriever	0.118199	True	NaN	63	1	

351	French_bulldog	0.000428	True	NaN	63	26
358	sea_lion	0.026364	False	NaN	63	21
365	refrigerator	0.007499	False	NaN	63	18
367	toy_terrier	0.117502	True	pupper	63	16
383	American_Staffordshire_terrier	0.096435	True	NaN	63	5
407	Chesapeake_Bay_retriever	0.121523	True	NaN	63	18
420	kuvasz	0.005410	True	NaN	63	6
444	purse	0.051333	False	pupper	65	25
454	bath_towel	0.116806	False	NaN	63	18
469	Brittany_spaniel	0.162084	True	NaN	63	11
641	book_jacket	0.046638	False	NaN	61	21
997	Old_English_sheepdog	0.093952	True	NaN	-1	12
1273	oscilloscope	0.000142	False	NaN	69	20

	month	year
22	7	2017
44	6	2017
82	5	2017
118	4	2017
137	3	2017
154	2	2017
178	1	2017
188	1	2017
197	1	2017
200	1	2017
204	1	2017
208	1	2017
212	1	2017
239	12	2016
243	12	2016
247	12	2016
250	12	2016
258	11	2016
276	11	2016
277	11	2016
278	11	2016
279	11	2016
286	11	2016
289	11	2016
293	11	2016
306	10	2016
308	10	2016
318	10	2016
327	10	2016
336	10	2016
342	10	2016
351	9	2016
358	9	2016

```

365      9  2016
367      9  2016
383      9  2016
407      8  2016
420      8  2016
444      7  2016
454      7  2016
469      7  2016
641      3  2016
997     12  2015
1273    11  2015

```

```
[44 rows x 35 columns]
```

```

In [40]: # Keep original ratings
combined = combined.loc[combined['text'].str.startswith('RT') == False]

```

Test

```
In [41]: combined.head()
```

```

Out[41]:    Likes  Retweets      tweet_id in_reply_to_status_id \
0    22053      3481  891815181378084864             nan
1    36938      7225  891689557279858688             nan
2    35309      7760  891327558926688256             nan
3    17812      2602  891087950875897856             nan
4     56865     15753  890729181411237888             nan

```

```

      in_reply_to_user_id      timestamp      source \
0             nan  2017-07-31 00:18:03  Twitter for iPhone
1             nan  2017-07-30 15:58:51  Twitter for iPhone
2             nan  2017-07-29 16:00:24  Twitter for iPhone
3             nan  2017-07-29 00:08:17  Twitter for iPhone
4             nan  2017-07-28 00:22:40  Twitter for iPhone

```

```

0          This is Archie. He is a rare Norwegian Pouncing Corgo. Lives in the
1                                     This is Darla. She commen
2  This is Franklin. He would like you to stop calling him "cute." He is a very fierce
3  Here we have a majestic great white breaching off South Africa's coast. Absolutely h
4          When you watch your owner call another dog a good boy but then t

```

```

      retweeted_status_id  retweeted_status_user_id  ...  p2_conf  p2_dog \
0             NaN             NaN  ...  0.078253  True
1             NaN             NaN  ...  0.168086  True
2             NaN             NaN  ...  0.225770  True
3             NaN             NaN  ...  0.116317  True
4             NaN             NaN  ...  0.178406  True

```


		p3	p3_conf	p3_dog	dog_stages	indexes	day	month	\
0		kelpie	0.031379	True	NaN	-1	31	7	
1		spatula	0.040836	False	NaN	-1	30	7	
2	German_short-haired_pointer		0.175219	True	NaN	63	29	7	
3	Indian_elephant		0.076902	False	NaN	-1	29	7	
4	Pembroke		0.076507	True	NaN	63	28	7	

	year
0	2017
1	2017
2	2017
3	2017
4	2017

[5 rows x 35 columns]

1.3.9 Issue #9: Predicted dog breed names in predictions contains hyphens.

Define: Replace hyphen with blank in breed names

Code

```
In [42]: combined.loc[combined.breed.str.contains(pat = '-') == True, 'breed'] = combined.breed.s
```

Test

```
In [43]: combined.breed.unique()
```

```
Out[43]: array(['Chihuahua', 'paper_towel', 'basset', 'Chesapeake_Bay_retriever',
                'Pomeranian', 'Irish_terrier', 'Samoyed', 'French_bulldog',
                'whippet', 'golden_retriever', 'Siberian_husky', 'limousine',
                'Mexican_hairless', 'kuvasz', 'convertible', 'Blenheim_spaniel',
                'pug', 'malamute', 'Pembroke', 'Eskimo_dog', 'Labrador_retriever',
                'Saluki', 'tusker', 'German_short haired_pointer', 'tricycle',
                'tabby', 'bloodhound', 'Bernese_mountain_dog',
                'West_Highland_white_terrier', 'cocker_spaniel',
                'flat coated_retriever', 'Cardigan', 'vizsla', 'home_theater',
                'pole', 'bull_mastiff', 'Australian_terrier', 'chow',
                'Bedlington_terrier', 'lakeside', 'chimpanzee', 'Angora',
                'Boston_bull', 'Old_English_sheepdog', 'English_springer',
                'German_shepherd', 'grille', 'Great_Dane', 'Yorkshire_terrier',
                'tennis_ball', 'Shetland_sheepdog', 'schipperke', 'patio',
                'sea_lion', 'Airedale', 'giant_schnauzer', 'Dandie_Dinmont',
                'Irish_water_spaniel', 'Brittany_spaniel', 'teapot',
                'Staffordshire_bullterrier', 'swing', 'Norwegian_elkhound',
                'shopping_cart', 'Border_collie', 'Border_terrier',
                'Rhodesian_ridgeback', 'Pekinese', 'briard', 'toy_poodle', 'boxer',
```

'American_Staffordshire_terrier', 'Great_Pyrenees', 'Rottweiler',
 'cairn', 'dingo', 'bathtub', 'Gordon_setter', 'standard_poodle',
 'miniature_schnauzer', 'Doberman', 'kelpie', 'Tibetan_mastiff',
 'restaurant', 'dalmatian', 'miniature_poodle', 'Siamese_cat',
 'Irish_setter', 'loupe', 'bath_towel', 'beagle', 'Norwich_terrier',
 'Greater_Swiss_Mountain_dog', 'malinois', 'shield',
 'miniature_pinscher', 'minivan', 'Norfolk_terrier', 'collie',
 'gas_pump', 'Afghan_hound', 'wire_haired_fox_terrier',
 'Italian_greyhound', 'bakery', 'jack o' lantern', 'komondor',
 'dishwasher', 'refrigerator', 'tub', 'remote_control', 'seat_belt',
 'Leonberg', 'teddy', 'porcupine', 'quilt', 'pool_table', 'padlock',
 'Saint_Bernard', 'sundial', 'clumber', 'mousetrap', 'web_site',
 'long_horned_beetle', 'Walker_hound', 'giant_panda',
 'silky_terrier', 'Newfoundland', 'papillon', 'meerkat', 'basenji',
 'lion', 'coral_reef', 'keeshond', 'redbone', 'African_grey',
 'paddle', 'gondola', 'cougar', 'axolotl', 'radio_telescope',
 'balloon', 'Sussex_spaniel', 'barrow', 'bookshop', 'skunk',
 'doormat', 'geyser', 'conch', 'rotisserie', 'bluetick', 'goose',
 'Lakeland_terrier', 'American_black_bear', 'Shih_Tzu', 'bow_tie',
 'borzoi', 'tiger_shark', 'ox', 'Tibetan_terrier', 'coil',
 'ice_bear', 'Weimaraner', 'hippopotamus', 'lawn_mower', 'wombat',
 'guinea_pig', 'studio_couch', 'Maltese_dog', 'Lhasa',
 'English_setter', 'hand_blower', 'stone_wall', 'window_shade',
 'bonnet', 'alp', 'badger', 'car_mirror', 'timber_wolf', 'espresso',
 'leatherback_turtle', 'cowboy_hat', 'bib', 'hotdog', 'agama', 'ram',
 'wild_boar', 'space_heater', 'Egyptian_cat', 'wool', 'wallaby',
 'white_wolf', 'tailed_frog', 'hamster', 'hummingbird', 'washbasin',
 'grey_fox', 'weasel', 'beaver', 'Scottish_deerhound', 'ice_lolly',
 'soft_coated_wheaten_terrier', 'bison', 'bighorn', 'motor_scooter',
 'bustard', 'dogsled', 'snowmobile', 'crane', 'bannister', 'sorrel',
 'wood_rabbit', 'damselfly', 'sliding_door', 'clog', 'minibus',
 'llama', 'cheetah', 'hog', 'koala', 'toyshop', 'triceratops',
 'bubble', 'Christmas_stocking', 'pillow', 'earthstar', 'mailbox',
 'panpipe', 'water_buffalo', 'Japanese_spaniel', 'common_iguana',
 'guenon', 'Loafer', 'standard_schnauzer', 'dough', 'box_turtle',
 'upright', 'bow', 'street_sign', 'ocarina', 'shower_curtain',
 'tick', 'African_crocodile', 'soccer_ball', 'Brabancon_griffon',
 'acorn_squash', 'brown_bear', 'toilet_tissue', 'toilet_seat',
 'suit', 'water_bottle', 'Arctic_fox', 'ski_mask', 'leaf_beetle',
 'sandbar', 'starfish', 'microwave', 'terrapin', 'carton',
 'bee_eater', 'china_cabinet', 'prayer_rug', 'hen', 'hermit_crab',
 'zebra', 'picket_fence', 'African_hunting_dog', 'pitcher',
 'microphone', 'flamingo', 'scorpion', 'Ibizan_hound', 'peacock',
 'sea_urchin', 'ping_pong_ball', 'platypus', 'snail', 'candle',
 'seashore', 'comic_book', 'Arabian_camel', 'jellyfish', 'vacuum',
 'crash_helmet', 'bearskin', 'shopping_basket', 'king_penguin',
 'canoe', 'trombone', 'frilled_lizard', 'jigsaw_puzzle', 'lorikeet',
 'fire_engine', 'electric_fan', 'hare', 'hyena', 'hay',

```
'toy_terrier', 'black and tan_coonhound', 'three toed_sloth',
'desktop_computer'], dtype=object)
```

```
In [44]: combined.columns
```

```
Out[44]: Index(['Likes', 'Retweets', 'tweet_id', 'in_reply_to_status_id',
               'in_reply_to_user_id', 'timestamp', 'source', 'text',
               'retweeted_status_id', 'retweeted_status_user_id',
               'retweeted_status_timestamp', 'expanded_urls', 'rating_numerator',
               'rating_denominator', 'name', 'doggo', 'floofer', 'pupper', 'puppo',
               'jpg_url', 'img_num', 'breed', 'confidence', 'is_dog', 'p2', 'p2_conf',
               'p2_dog', 'p3', 'p3_conf', 'p3_dog', 'dog_stages', 'indexes', 'day',
               'month', 'year'],
               dtype='object')
```

1.3.10 Issue #10: Drop unnecessary columns

Define: Drop `in_reply_to_status_id`, `in_reply_to_user_id`, `retweeted_status_user_id`, `retweeted_status_timestamp`, `doggo`, `floofer`, `puppo`, `pupper`, `p2` & `p3` cols, index

Code

```
In [45]: # columns to be dropped
cols = ['in_reply_to_status_id', 'in_reply_to_user_id', 'retweeted_status_user_id', 'retweeted_status_timestamp',
        'p2_dog', 'p3', 'p3_conf', 'p3_dog', 'indexes']

# drop unnecessary columns
combined.drop(columns=cols, axis=1, inplace=True)
#reorder columns
cols_names = ['tweet_id', 'Likes', 'Retweets', 'source', 'text', 'retweeted_status_id',
              'rating_denominator', 'name', 'jpg_url', 'img_num', 'breed', 'confidence', 'is_dog', 'dog_stages', 'day', 'month', 'year']
combined = combined.reindex(columns = cols_names)
```

Test

```
In [46]: combined.columns
```

```
Out[46]: Index(['tweet_id', 'Likes', 'Retweets', 'source', 'text',
               'retweeted_status_id', 'expanded_urls', 'rating_numerator',
               'rating_denominator', 'name', 'jpg_url', 'img_num', 'breed',
               'confidence', 'is_dog', 'dog_stages', 'day', 'month', 'year'],
               dtype='object')
```

1.4 Storing Data

Save gathered, assessed, and cleaned master dataset to a CSV file named "twitter_archive_master.csv".

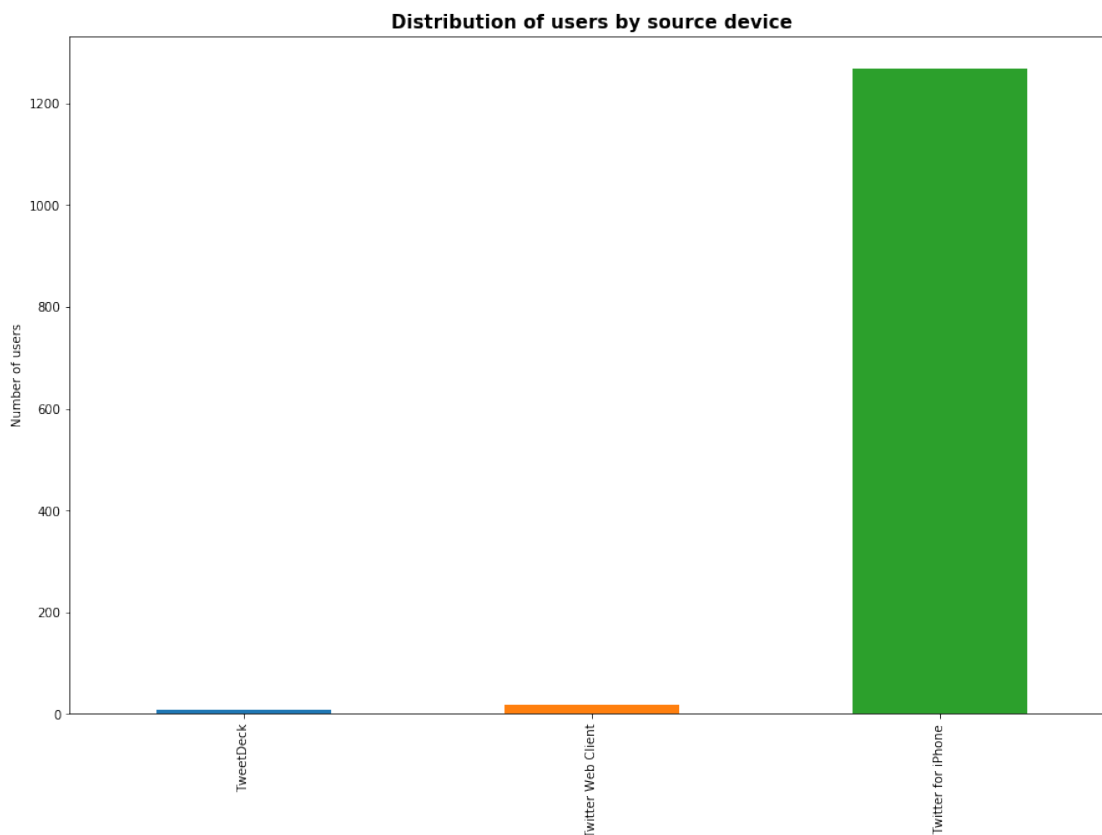
```
In [47]: combined.to_csv('twitter_archive_master.csv', encoding='utf-8', index=False)
```

1.5 Analyzing and Visualizing Data

In this section, analyze and visualize your wrangled data. You must produce at least **three (3) insights and one (1) visualization**.

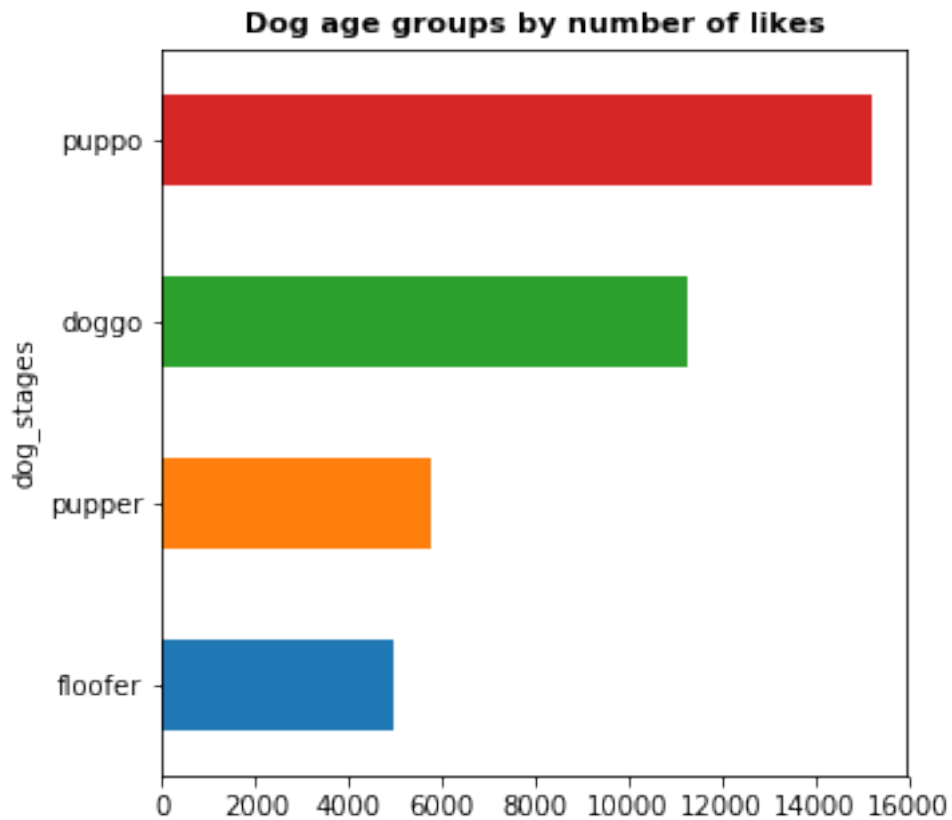
Insights and Visualizations 1. Distribution of user source devices

```
In [48]: sources_count = combined['source'].value_counts()
sources_count.sort_values().plot.bar(figsize = (15,10))
plt.ylabel('Sources')
plt.ylabel('Number of users')
plt.title('Distribution of users by source device', weight='bold', fontsize=15)
plt.savefig('sources.png')
```



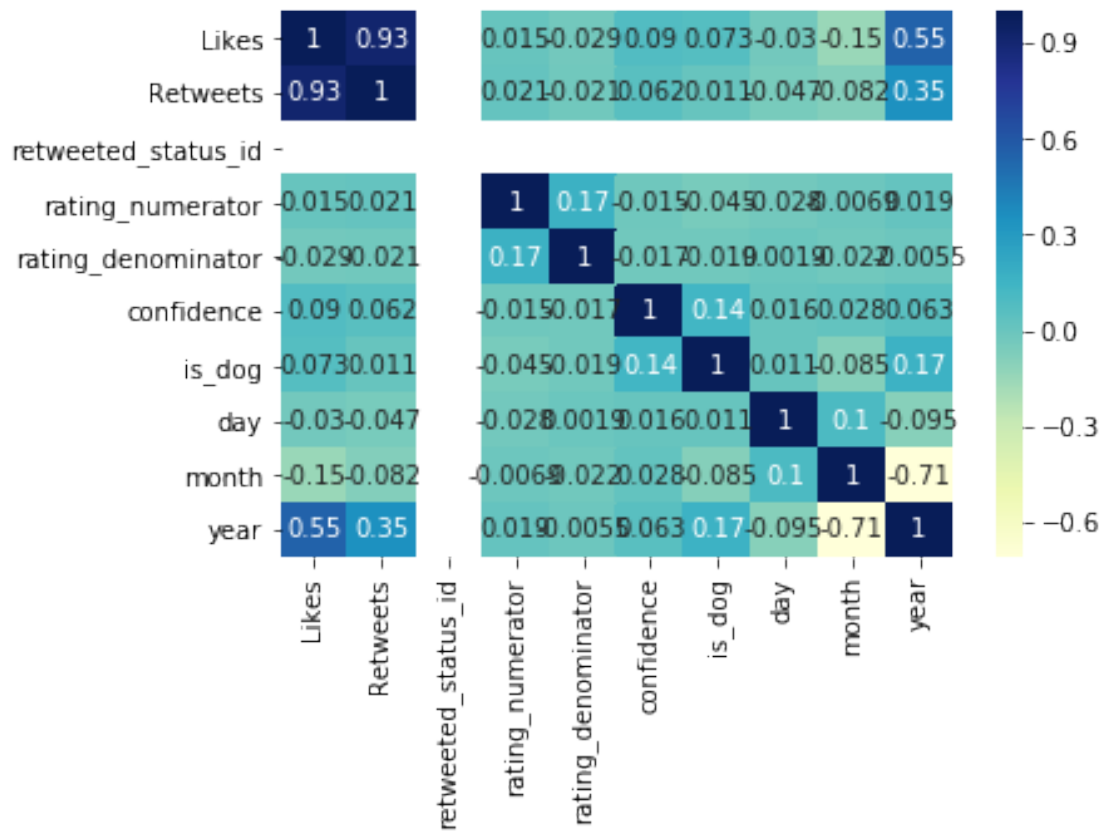
2. Most popular dog age group

```
In [49]: combined.groupby(['dog_stages']).Likes.mean().sort_values(ascending=True).plot(kind='bar')
plt.title('Dog age groups by number of likes', weight='bold', fontsize=11)
plt.savefig('a.png')
```



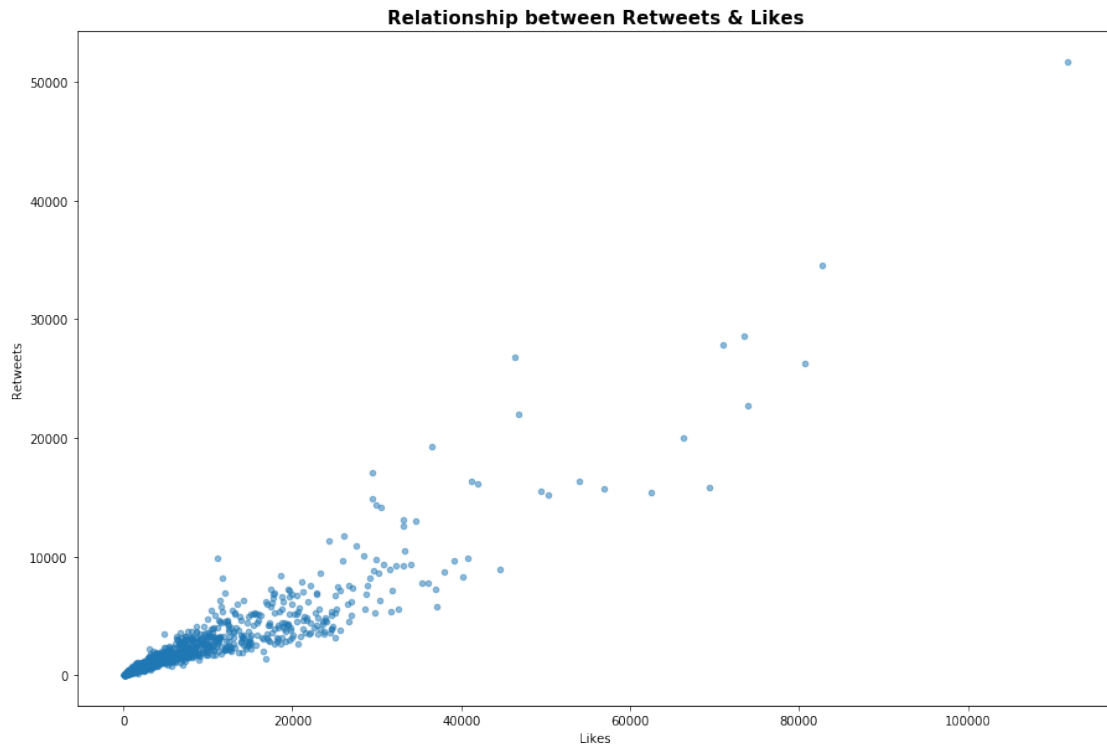
3. Correlation between Likes and Retweets

```
In [50]: # plotting correlation heatmap
dataplot = sb.heatmap(combined.corr(), cmap="YlGnBu", annot=True)
# display heatmap
plt.show()
plt.savefig('corr_rt.png')
```



<matplotlib.figure.Figure at 0x7f285cd01128>

```
In [51]: x = combined.plot(kind = 'scatter', x = 'Likes', y = 'Retweets', figsize = (15,10), alp
x.grid(False)
plt.xlabel('Likes')
plt.ylabel('Retweets')
plt.title('Relationship between Retweets & Likes', weight='bold', fontsize=15)
plt.savefig('like_rt.png')
```



In []: