

# Project: Wrangling and Analyze Data

```
In [1]: #importing the necessary libraries for this project

import pandas as pd
import numpy as np
import requests
import tweepy
from tweepy import OAuthHandler
import json
from timeit import default_timer as timer
%matplotlib inline
import seaborn as sns
import matplotlib.pyplot as plt
```

## Data Gathering

In the cell below, I gathered **all** three pieces of data for this project and loaded them in the notebook. **Note:** the methods required to gather each data are different.

1. I directly downloaded the WeRateDogs Twitter archive data (twitter\_archive\_enhanced.csv)

```
In [2]: # using pandas to read the csv file
df1 = pd.read_csv('twitter-archive-enhanced.csv')
df1
```

Out[2]:

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56 +0000	href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...	
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	href="http://twitter.com/download/iphone" r...	This is Tilly. She's just checking pup on you....	
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	href="http://twitter.com/download/iphone" r...	This is Archie. He is a rare Norwegian Pouncin...	
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	href="http://twitter.com/download/iphone" r...	This is Darla. She commenced a snooze mid meal...	
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	href="http://twitter.com/download/iphone" r...	This is Franklin. He would like you to stop ca...	
...	...	...	...	...	...	...	...
2351	666049248165822465	NaN	NaN	2015-11-16 00:24:50 +0000	href="http://twitter.com/download/iphone" r...	Here we have a 1949 1st generation vulpix. Enj...	
2352	666044226329800704	NaN	NaN	2015-11-16 00:04:52 +0000	href="http://twitter.com/download/iphone" r...	This is a purebred Piers Morgan. Loves to Netf...	
2353	666033412701032449	NaN	NaN	2015-11-15 23:21:54 +0000	href="http://twitter.com/download/iphone" r...	Here is a very happy pup. Big fan of well-main...	
2354	666029285002620928	NaN	NaN	2015-11-15 23:05:30 +0000	href="http://twitter.com/download/iphone" r...	This is a western brown Mitsubishi terrier. Up...	
2355	666020888022790149	NaN	NaN	2015-11-15 22:32:08 +0000	href="http://twitter.com/download/iphone" r...	Here we have a Japanese Irish Setter. Lost eye...	

2356 rows × 17 columns

- Using the Requests library to download the tweet image prediction (image\_predictions.tsv)

```
In [3]: # the url where the data is located is specified below
url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions/image-predictions.ts

# using request to download the dataset
response = requests.get(url)
with open(url.split('/')[-1], mode='wb') as file:
    file.write(response.content)
```

```
In [4]: # using pandas to read the csv file downloaded
df2= pd.read_csv('image-predictions.tsv', sep='\t')
df2
```

Out[4]:	tweet_id	jpg_url	img_num	p1	p1_conf	p1_dog
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg	1	Welsh_springer_spaniel	0.465074	True
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg	1	redbone	0.506826	True
2	666033412701032449	https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg	1	German_shepherd	0.596461	True
3	666044226329800704	https://pbs.twimg.com/media/CT5Dr8HUEAA-IEu.jpg	1	Rhodesian_ridgeback	0.408143	True
4	666049248165822465	https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg	1	miniature_pinscher	0.560311	True
...	...	...	...	...	...	...
2070	891327558926688256	https://pbs.twimg.com/media/DF6hr6BUMAAzZgT.jpg	2	basset	0.555712	True
2071	891689557279858688	https://pbs.twimg.com/media/DF_q7IAWsAEuuN8.jpg	1	paper_towel	0.170278	False
2072	891815181378084864	https://pbs.twimg.com/media/DGBdLU1WsAANxJ9.jpg	1	Chihuahua	0.716012	True
2073	892177421306343426	https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg	1	Chihuahua	0.323581	True
2074	892420643555336193	https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.jpg	1	orange	0.097049	False

2075 rows × 7 columns

1. Using the Tweepy library to query additional data via the Twitter API (tweet\_json.txt)

The cell below loads the data via Twitter API, but according to Twitter rules my cosummer key, consumer secret, access token, and access secret must be kept a secret. Hence, their values in asterisks.

```
In [5]: consumer_key = '*****'
consumer_secret = '*****'
access_token = '***'
access_secret = '*****'

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

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

In [6]: # making a list of the tweet id values and getting the length
tweet_id_list = df1.tweet_id.values
len(tweet_id_list)
```

Out[6]: 2356

Twitter returns a JSON format for each tweet requested. The cell below converts the JSON into a txt file, for scalability. Also, some tweets won't load (most likely deleted), and are therefore saved into a dictionary.

```
In [8]: count = 0
fails_dict = {}
start = timer()
# Save each tweet's returned JSON as a new line in a .txt file
with open('tweet_json.txt', 'w') as outfile:
    # This loop will likely take 20-30 minutes to run because of Twitter's rate limit
    for tweet_id in tweet_id_list:
        count += 1
        print(str(count) + ": " + str(tweet_id))
        try:
            tweet = api.get_status(tweet_id, tweet_mode='extended')
            print("Success")
            json.dump(tweet._json, outfile)
            outfile.write('\n')
        except tweepy.TweepyException as e:
            print("Fail")
            fails_dict[tweet_id] = e
        pass
end = timer()
print(end - start)
print(fails_dict)

1: 892420643555336193
Success
2: 892177421306343426
Success
3: 891815181378084864
Success
4: 891689557279858688
Success
5: 891327558926688256
Success
6: 891087950875897856
Success
7: 890971913173991426
Success
```

8: 890729181411237888  
Success  
9: 890609185150312448  
Success  
10: 890240255349198849  
Success  
11: 890006608113172480  
Success  
12: 889880896479866881  
Success  
13: 889665388333682689  
Success  
14: 889638837579907072  
Success  
15: 889531135344209921  
Success  
16: 889278841981685760  
Success  
17: 888917238123831296  
Success  
18: 888804989199671297  
Success  
19: 888554962724278272  
Success  
20: 888202515573088257  
Fail  
21: 888078434458587136  
Success  
22: 887705289381826560  
Success  
23: 887517139158093824  
Success  
24: 887473957103951883  
Success  
25: 887343217045368832  
Success  
26: 887101392804085760  
Success  
27: 886983233522544640  
Success  
28: 886736880519319552  
Success  
29: 886680336477933568  
Success  
30: 886366144734445568  
Success  
31: 886267009285017600  
Success  
32: 886258384151887873  
Success  
33: 886054160059072513  
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34: 885984800019947520  
Success  
35: 885528943205470208  
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36: 885518971528720385  
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37: 885311592912609280  
Success  
38: 885167619883638784  
Success  
39: 884925521741709313  
Success  
40: 884876753390489601  
Success  
41: 884562892145688576  
Success  
42: 884441805382717440  
Success  
43: 884247878851493888  
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44: 884162670584377345  
Success  
45: 883838122936631299  
Success  
46: 883482846933004288  
Success  
47: 883360690899218434  
Success  
48: 883117836046086144  
Success  
49: 882992080364220416  
Success  
50: 882762694511734784  
Success  
51: 882627270321602560  
Success  
52: 882268110199369728

Success  
53: 882045870035918850  
Success  
54: 881906580714921986  
Success  
55: 881666595344535552  
Success  
56: 881633300179243008  
Success  
57: 881536004380872706  
Success  
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Success  
60: 880872448815771648  
Success  
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Success  
62: 880221127280381952  
Success  
63: 880095782870896641  
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65: 879674319642796034  
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Success  
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Success  
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Success  
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Success  
94: 874057562936811520  
Success  
95: 874012996292530176  
Success  
96: 873697596434513921  
Fail

97: 873580283840344065  
Success  
98: 873337748698140672  
Success  
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Success  
100: 872967104147763200  
Success  
101: 872820683541237760  
Success  
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103: 872620804844003328  
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274: 840728873075638272  
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Success  
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Fail  
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Success  
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Success  
301: 836753516572119041  
Success  
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Success  
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Success  
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Success  
305: 836380477523124226  
Success  
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Success  
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315: 835172783151792128  
Success  
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Success  
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Success  
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Success  
319: 834574053763584002

Success  
320: 834477809192075265  
Success  
321: 834458053273591808  
Success  
322: 834209720923721728  
Success  
323: 834167344700198914  
Success  
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Success  
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Success  
327: 833826103416520705  
Success  
328: 833732339549220864  
Success  
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Success  
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2203: 668643542311546881  
Success  
2204: 668641109086707712  
Success  
2205: 668636665813057536  
Success  
2206: 668633411083464705  
Success  
2207: 668631377374486528  
Success  
2208: 668627278264475648  
Success  
2209: 668625577880875008  
Success  
2210: 668623201287675904  
Success  
2211: 668620235289837568  
Success  
2212: 668614819948453888  
Success  
2213: 668587383441514497  
Success  
2214: 668567822092664832  
Success  
2215: 668544745690562560  
Success  
2216: 668542336805281792  
Success  
2217: 668537837512433665  
Success  
2218: 668528771708952576  
Success  
2219: 668507509523615744  
Success  
2220: 668496999348633600  
Success  
2221: 668484198282485761  
Success  
2222: 668480044826800133  
Success  
2223: 668466899341221888  
Success  
2224: 668297328638447616  
Success  
2225: 668291999406125056  
Success  
2226: 668286279830867968  
Success  
2227: 668274247790391296  
Success  
2228: 668268907921326080  
Success  
2229: 668256321989451776  
Success  
2230: 668248472370458624  
Success  
2231: 668237644992782336  
Success  
2232: 668226093875376128  
Success

2233: 668221241640230912  
Success  
2234: 668204964695683073  
Success  
2235: 668190681446379520  
Success  
2236: 668171859951755264  
Success  
2237: 668154635664932864  
Success  
2238: 668142349051129856  
Success  
2239: 668113020489474048  
Success  
2240: 667937095915278337  
Success  
2241: 667924896115245057  
Success  
2242: 667915453470232577  
Success  
2243: 667911425562669056  
Success  
2244: 667902449697558528  
Success  
2245: 667886921285246976  
Success  
2246: 667885044254572545  
Success  
2247: 667878741721415682  
Success  
2248: 667873844930215936  
Success  
2249: 667866724293877760  
Success  
2250: 667861340749471744  
Success  
2251: 667832474953625600  
Success  
2252: 667806454573760512  
Success  
2253: 667801013445750784  
Success  
2254: 667793409583771648  
Success  
2255: 667782464991965184  
Success  
2256: 667773195014021121  
Success  
2257: 667766675769573376  
Success  
2258: 667728196545200128  
Success  
2259: 667724302356258817  
Success  
2260: 667550904950915073  
Success  
2261: 667550882905632768  
Success  
2262: 667549055577362432  
Success  
2263: 667546741521195010  
Success  
2264: 667544320556335104  
Success  
2265: 667538891197542400  
Success  
2266: 667534815156183040  
Success  
2267: 667530908589760512  
Success  
2268: 667524857454854144  
Success  
2269: 667517642048163840  
Success  
2270: 667509364010450944  
Success  
2271: 667502640335572993  
Success  
2272: 667495797102141441  
Success  
2273: 667491009379606528  
Success  
2274: 667470559035432960  
Success  
2275: 667455448082227200  
Success  
2276: 667453023279554560  
Success  
2277: 667443425659232256

Success  
2278: 667437278097252352  
Success  
2279: 667435689202614272  
Success  
2280: 667405339315146752  
Success  
2281: 667393430834667520  
Success  
2282: 667369227918143488  
Success  
2283: 667211855547486208  
Success  
2284: 667200525029539841  
Success  
2285: 667192066997374976  
Success  
2286: 667188689915760640  
Success  
2287: 667182792070062081  
Success  
2288: 667177989038297088  
Success  
2289: 667176164155375616  
Success  
2290: 667174963120574464  
Success  
2291: 667171260800061440  
Success  
2292: 667165590075940865  
Success  
2293: 667160273090932737  
Success  
2294: 667152164079423490  
Success  
2295: 667138269671505920  
Success  
2296: 667119796878725120  
Success  
2297: 667090893657276420  
Success  
2298: 667073648344346624  
Success  
2299: 667070482143944705  
Success  
2300: 667065535570550784  
Success  
2301: 667062181243039745  
Success  
2302: 667044094246576128  
Success  
2303: 667012601033924608  
Success  
2304: 666996132027977728  
Success  
2305: 666983947667116034  
Success  
2306: 666837028449972224  
Success  
2307: 666835007768551424  
Success  
2308: 666826780179869698  
Success  
2309: 666817836334096384  
Success  
2310: 666804364988780544  
Success  
2311: 666786068205871104  
Success  
2312: 666781792255496192  
Success  
2313: 666776908487630848  
Success  
2314: 666739327293083650  
Success  
2315: 666701168228331520  
Success  
2316: 666691418707132416  
Success  
2317: 666649482315059201  
Success  
2318: 666644823164719104  
Success  
2319: 666454714377183233  
Success  
2320: 666447344410484738  
Success  
2321: 666437273139982337  
Success

2322: 666435652385423360  
Success  
2323: 666430724426358785  
Success  
2324: 666428276349472768  
Success  
2325: 666421158376562688  
Success  
2326: 666418789513326592  
Success  
2327: 666411507551481857  
Success  
2328: 666407126856765440  
Success  
2329: 666396247373291520  
Success  
2330: 666373753744588802  
Success  
2331: 666362758909284353  
Success  
2332: 666353288456101888  
Success  
2333: 666345417576210432  
Success  
2334: 666337882303524864  
Success  
2335: 666293911632134144  
Success  
2336: 666287406224695296  
Success  
2337: 666273097616637952  
Success  
2338: 666268910803644416  
Success  
2339: 666104133288665088  
Success  
2340: 666102155909144576  
Success  
2341: 666099513787052032  
Success  
2342: 666094000022159362  
Success  
2343: 666082916733198337  
Success  
2344: 666073100786774016  
Success  
2345: 666071193221509120  
Success  
2346: 666063827256086533  
Success  
2347: 666058600524156928  
Success  
2348: 666057090499244032  
Success  
2349: 666055525042405380  
Success  
2350: 666051853826850816  
Success  
2351: 666050758794694657  
Success  
2352: 666049248165822465  
Success  
2353: 666044226329800704  
Success  
2354: 666033412701032449  
Success  
2355: 666029285002620928  
Success  
2356: 666020888022790149  
Success  
2256.2109804  
{888202515573088257: NotFound('404 Not Found\n144 - No status found with that ID.'), 873697596434513921: NotFound('404 Not Found\n144 - No status found with that ID.'), 872668790621863937: NotFound('404 Not Found\n144 - No status found with that ID.'), 872261713294495745: NotFound('404 Not Found\n144 - No status found with that ID.'), 869988702071779329: NotFound('404 Not Found\n144 - No status found with that ID.'), 866816280283807744: NotFound('404 Not Found\n144 - No status found with that ID.'), 861769973181624320: NotFound('404 Not Found\n144 - No status found with that ID.'), 856602993587888130: NotFound('404 Not Found\n144 - No status found with that ID.'), 856330835276025856: NotFound('404 Not Found\n144 - No status found with that ID.'), 851953902622658560: NotFound('404 Not Found\n144 - No status found with that ID.'), 851861385021730816: NotFound('404 Not Found\n144 - No status found with that ID.'), 845459076796616705: NotFound('404 Not Found\n144 - No status found with that ID.'), 844704788403113984: NotFound('404 Not Found\n144 - No status found with that ID.'), 842892208864923648: NotFound('404 Not Found\n144 - No status found with that ID.'), 837366284874571778: NotFound('404 Not Found\n144 - No status found with that ID.'), 837012587749474308: NotFound('404 Not Found\n144 - No status found with that ID.'), 829374341691346946: NotFound('404 Not Found\n144 - No status found with that ID.'), 82722825079974297: NotFound('404 Not Found\n144 - No status found with that ID.'), 812747805718642688: NotFound('404 Not Found\n144 - No status found with that ID.'), 802247111496568832: NotFound('404 Not Found\n144 - No status found with that ID.'), 779123168116150273: NotFound('404 Not Found\n144 - No status found with that ID.'), 775096608509886464: NotFound('404 Not Found\n144 - No status found with that ID.'), 771004394259247104: Forbidden('403 Forbidden\n179- Sorry, you are not authorized to see this status.'), 770743923962707968: NotFound('404 Not Found\n144



```
- No status found with that ID. '), 766864461642756096: NotFound('404 Not Found\n144 - No status found with that ID. '), 759923798737051648: NotFound('404 Not Found\n144 - No status found with that ID. '), 759566828574212096: NotFound('404 Not Found\n144 - No status found with that ID. '), 754011816964026368: NotFound('404 Not Found\n144 - No status found with that ID. '), 680055455951884288: NotFound('404 Not Found\n144 - No status found with that ID. '))}
```

The loaded data in the txt file is made a list and appended into a dataframe as shown in the cell below.

```
In [7]: df_list = []

with open ('tweet_json.txt', mode='r') as file:
    for line in file:
        data= json.loads(line)
        tweet_id = data['id']
        retweet_count = data['retweet_count']
        favorite_count = data['favorite_count']
        df_list.append({'tweet_id':int(tweet_id),
                        'retweet_count': int(retweet_count),
                        'favorite_count': int(favorite_count)})

In [8]: # the dataframe is loaded and displayed
df3 = pd.DataFrame(df_list, columns=['tweet_id', 'retweet_count', 'favorite_count'])
df3
```

```
Out[8]:
```

	tweet_id	retweet_count	favorite_count
0	89242064355336193	7001	33804
1	892177421306343426	5299	29318
2	891815181378084864	3477	22041
3	891689557279858688	7224	36926
4	891327558926688256	7754	35302
...	...	...	...
2322	666049248165822465	37	89
2323	666044226329800704	115	247
2324	666033412701032449	36	100
2325	666029285002620928	39	112
2326	666020888022790149	422	2292

2327 rows × 3 columns

## Assessing Data

In this section, I detected and documented **eight (8) quality issues and two (2) tidiness issue**. Which I assessed **both** visually and programmatically.

The three datasets loaded before now are all related, and would therefore be merged into one. This is a tidiness issue and would be listed as one in the Tidiness section further down the notebook.

```
In [9]: # importing functools to merge all datasets
from functools import reduce

In [10]: df_join =[df1,df2,df3]

In [11]: # using the lambda function to merge the dataset
df = reduce(lambda left,right: pd.merge(left,right,on='tweet_id'), df_join)
df.head(1)
```

```
Out[11]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_status
0	89242064355336193	NaN	NaN	2017-08-01 16:23:56 +0000	href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...	N

1 rows × 30 columns

```
In [12]: # quick information on the dataset
df.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 2057 entries, 0 to 2056
Data columns (total 30 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   tweet_id                             2057 non-null   int64
1   in_reply_to_status_id                 23 non-null     float64
2   in_reply_to_user_id                  23 non-null     float64
3   timestamp                             2057 non-null   object
4   source                                2057 non-null   object
5   text                                  2057 non-null   object
6   retweeted_status_id                  71 non-null     float64
7   retweeted_status_user_id             71 non-null     float64
8   retweeted_status_timestamp           71 non-null     object
9   expanded_urls                         2057 non-null   object
10  rating_numerator                      2057 non-null   int64
11  rating_denominator                   2057 non-null   int64
12  name                                 2057 non-null   object
13  doggo                                2057 non-null   object
14  floofer                              2057 non-null   object
15  pupper                               2057 non-null   object
16  puppo                                2057 non-null   object
17  jpg_url                              2057 non-null   object
18  img_num                              2057 non-null   int64
19  p1                                    2057 non-null   object
20  p1_conf                              2057 non-null   float64
21  p1_dog                               2057 non-null   bool
22  p2                                    2057 non-null   object
23  p2_conf                              2057 non-null   float64
24  p2_dog                               2057 non-null   bool
25  p3                                    2057 non-null   object
26  p3_conf                              2057 non-null   float64
27  p3_dog                               2057 non-null   bool
28  retweet_count                         2057 non-null   int64
29  favorite_count                       2057 non-null   int64
dtypes: bool(3), float64(7), int64(6), object(14)
memory usage: 456.0+ KB

```

From the information of the dataframe displayed above, some quality issues can be identified such as; the timestamp column is in object format, ideally it should be in datetime format. The 'tweet\_id' column should be in string format not integer format. It also shows that the 'in\_reply\_to\_status\_id', 'retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp', 'in\_reply\_to\_user\_id' column has too many null values. The column name should be floof not floofer according to the dog dictionary.

```

In [13]: # returns the first five rows of the dataframe
df.head()

```

```

Out[13]:

```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_sta
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56 +0000	<a href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...	
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	<a href="http://twitter.com/download/iphone" r...	This is Tilly. She's just checking pup on you....	
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	<a href="http://twitter.com/download/iphone" r...	This is Archie. He is a rare Norwegian Pouncin...	
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	<a href="http://twitter.com/download/iphone" r...	This is Darla. She commenced a snooze mid meal...	
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	<a href="http://twitter.com/download/iphone" r...	This is Franklin. He would like you to stop ca...	

5 rows × 30 columns

Visually assessing the table, some other quality issues can be seen such as; the source column as displayed above looks messy and clusters the table.

```

In [14]: # returns all entries for columns p1, p2 and p3
df.iloc[:, [19, 22, 25]]

```

Out[14]:

	p1	p2	p3
0	orange	bagel	banana
1	Chihuahua	Pekinese	papillon
2	Chihuahua	malamute	kelpie
3	paper_towel	Labrador_retriever	spatula
4	basset	English_springer	German_short-haired_pointer
...	...	...	...
2052	miniature_pinscher	Rottweiler	Doberman
2053	Rhodesian_ridgeback	redbone	miniature_pinscher
2054	German_shepherd	malinois	bloodhound
2055	redbone	miniature_pinscher	Rhodesian_ridgeback
2056	Welsh_springer_spaniel	collie	Shetland_sheepdog

2057 rows × 3 columns

Also, visually assesing the type of dogs in columns p1, p2 and p3 it shows both lower and uppercase letters, this is a quality issue.

```
In [15]: # returns unique values of the rating numerator column
set(df['rating_numerator'])
```

Out[15]:

```
{0,
1,
2,
3,
4,
5,
6,
7,
8,
9,
10,
11,
12,
13,
14,
15,
24,
26,
27,
44,
45,
50,
60,
75,
80,
84,
88,
99,
121,
143,
144,
165,
204,
420,
1776}
```

From the unique values displayed in the rating numerator column, some values appear not to be a realistic ratings over 10. This is a quality issue that need handling.

```
In [16]: set(df['rating_denominator'])
```

Out[16]: {2, 7, 10, 11, 20, 40, 50, 70, 80, 90, 110, 120, 130, 150, 170}

The rating denominator column should have a consistent value of 10. But the unique values in this column says otherwise, it needs to be cleaned.

```
In [17]: df.iloc[:, 13:17]
```

Out[17]:

	doggo	floofer	pupper	puppo
0	None	None	None	None
1	None	None	None	None
2	None	None	None	None
3	None	None	None	None
4	None	None	None	None
...	...	...	...	...
2052	None	None	None	None
2053	None	None	None	None
2054	None	None	None	None
2055	None	None	None	None
2056	None	None	None	None

2057 rows × 4 columns

The 'doggo','floofer','pupper' and 'puppo' columns have so many 'None' values, this is because these columns should ideally be an observation, not a column. This is a tidiness issue that needs handling.

## Quality issues

1. The timestamp column should be in datetime format not object format.
2. Retweet values in row dropped.
3. The 'tweet\_id' column should be in string format not integer format.
4. The 'floofer' column should be renamed to 'flood'.
5. The 'source' column looks too messy and clusters the table, will be dropped.
6. The type of dogs in p1, p2 and p3 column contains both lower and uppercase letters, needs to be handled.
7. The 'in\_reply\_to\_status\_id', 'retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp', 'in\_reply\_to\_user\_id' column has too many null values, and won't be relevant to this analysis, it will be dropped.
8. Incorrect ratings in columns fixed.

## Tidiness issues

1. The 'doggo', 'flood', 'pupper', 'puppo' column should not be a column because it is an observation.
2. The three datasets will be merged into one, because it is relational data.

## Cleaning Data

In this section, I cleaned **all** of the issues I documented while assessing.

In [18]:

```
# Make copies of original pieces of data
df_copy=df.copy()
df_copy
```

Out[18]:	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted
	0	892420643555336193	NaN	NaN	2017-08-01 16:23:56 +0000	href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...
	1	892177421306343426	NaN	NaN	2017-08-01 00:17:27 +0000	href="http://twitter.com/download/iphone" r...	This is Tilly. She's just checking pup on you....
	2	891815181378084864	NaN	NaN	2017-07-31 00:18:03 +0000	href="http://twitter.com/download/iphone" r...	This is Archie. He is a rare Norwegian Pouncin...
	3	891689557279858688	NaN	NaN	2017-07-30 15:58:51 +0000	href="http://twitter.com/download/iphone" r...	This is Darla. She commenced a snooze mid meal...
	4	891327558926688256	NaN	NaN	2017-07-29 16:00:24 +0000	href="http://twitter.com/download/iphone" r...	This is Franklin. He would like you to stop ca...
	...	...	...	...	...	...	...
	2052	666049248165822465	NaN	NaN	2015-11-16 00:24:50 +0000	href="http://twitter.com/download/iphone" r...	Here we have a 1949 1st generation vulpix. Enj...
	2053	666044226329800704	NaN	NaN	2015-11-16 00:04:52 +0000	href="http://twitter.com/download/iphone" r...	This is a purebred Piers Morgan. Loves to Netf...
	2054	666033412701032449	NaN	NaN	2015-11-15 23:21:54 +0000	href="http://twitter.com/download/iphone" r...	Here is a very happy pup. Big fan of well-main...
	2055	666029285002620928	NaN	NaN	2015-11-15 23:05:30 +0000	href="http://twitter.com/download/iphone" r...	This is a western brown Mitsubishi terrier. Up...
	2056	666020888022790149	NaN	NaN	2015-11-15 22:32:08 +0000	href="http://twitter.com/download/iphone" r...	Here we have a Japanese Irish Setter. Lost eye...
2057 rows × 30 columns							

## Issue #1:

Define: The timestamp column will be converted from object format into a datetime format.

Code

```
In [19]: df_copy['timestamp'] = pd.to_datetime(df_copy['timestamp'])
```

```
In [20]: df_copy.head(1)
```

Out[20]:	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_st
	0	892420643555336193	NaN	NaN	2017-08-01 16:23:56+00:00	href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...

1 rows × 30 columns

Test

```
In [21]: df_copy.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2057 entries, 0 to 2056
Data columns (total 30 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   tweet_id                             2057 non-null   int64
1   in_reply_to_status_id                 23 non-null     float64
2   in_reply_to_user_id                   23 non-null     float64
3   timestamp                             2057 non-null   datetime64[ns, UTC]
4   source                                2057 non-null   object
5   text                                  2057 non-null   object
6   retweeted_status_id                   71 non-null     float64
7   retweeted_status_user_id              71 non-null     float64
8   retweeted_status_timestamp            71 non-null     object
9   expanded_urls                         2057 non-null   object
10  rating_numerator                       2057 non-null   int64
11  rating_denominator                     2057 non-null   int64
12  name                                   2057 non-null   object
13  doggo                                  2057 non-null   object
14  floofer                                2057 non-null   object
15  pupper                                 2057 non-null   object
16  puppo                                  2057 non-null   object
17  jpg_url                                2057 non-null   object
18  img_num                                2057 non-null   int64
19  p1                                      2057 non-null   object
20  p1_conf                                2057 non-null   float64
21  p1_dog                                 2057 non-null   bool
22  p2                                      2057 non-null   object
23  p2_conf                                2057 non-null   float64
24  p2_dog                                 2057 non-null   bool
25  p3                                      2057 non-null   object
26  p3_conf                                2057 non-null   float64
27  p3_dog                                 2057 non-null   bool
28  retweet_count                          2057 non-null   int64
29  favorite_count                         2057 non-null   int64
dtypes: bool(3), datetime64[ns, UTC](1), float64(7), int64(6), object(13)
memory usage: 456.0+ KB
```

## Issue #2:

Define: Retweet values in row dropped.

### Code

```
In [22]: # Drop retweeted rows
df_copy = df_copy[df_copy.retweeted_status_id.isnull()]
df_copy = df_copy[df_copy.retweeted_status_user_id.isnull()]
df_copy = df_copy[df_copy.retweeted_status_timestamp.isnull()]
```

### Test

```
In [23]: # Check if the retweets have been dropped
print(df_copy.retweeted_status_id.notnull().sum())
print(df_copy.retweeted_status_user_id.notnull().sum())
print(df_copy.retweeted_status_timestamp.notnull().sum())

0
0
0
```

## Issue #3:

Define: Convert 'tweet\_id' column from int format to string format.

### Code

```
In [24]: df_copy['tweet_id'] = df_copy['tweet_id'].astype('str')
```

### Test

```
In [25]: df_copy.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 1986 entries, 0 to 2056
Data columns (total 30 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   tweet_id                             1986 non-null   object
1   in_reply_to_status_id                 23 non-null     float64
2   in_reply_to_user_id                  23 non-null     float64
3   timestamp                             1986 non-null   datetime64[ns, UTC]
4   source                               1986 non-null   object
5   text                                  1986 non-null   object
6   retweeted_status_id                  0 non-null      float64
7   retweeted_status_user_id             0 non-null      float64
8   retweeted_status_timestamp           0 non-null      object
9   expanded_urls                        1986 non-null   object
10  rating_numerator                      1986 non-null   int64
11  rating_denominator                   1986 non-null   int64
12  name                                 1986 non-null   object
13  doggo                               1986 non-null   object
14  floofer                              1986 non-null   object
15  pupper                              1986 non-null   object
16  puppo                               1986 non-null   object
17  jpg_url                             1986 non-null   object
18  img_num                             1986 non-null   int64
19  p1                                   1986 non-null   object
20  p1_conf                             1986 non-null   float64
21  p1_dog                              1986 non-null   bool
22  p2                                   1986 non-null   object
23  p2_conf                             1986 non-null   float64
24  p2_dog                              1986 non-null   bool
25  p3                                   1986 non-null   object
26  p3_conf                             1986 non-null   float64
27  p3_dog                              1986 non-null   bool
28  retweet_count                        1986 non-null   int64
29  favorite_count                       1986 non-null   int64
dtypes: bool(3), datetime64[ns, UTC](1), float64(7), int64(5), object(14)
memory usage: 440.3+ KB

```

#### Issue #4:

Define: The 'floofer' column should be renamed to 'floof'

Code

```
In [26]: df_copy.rename(columns={'floofer':'floof'}, inplace=True)
```

Test

```
In [27]: df_copy.head(1)
```

```
Out[27]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_st
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56+00:00	href="http://twitter.com/download/iphone"	This is Phineas. He's a mystical boy. Only eve...	

1 rows × 30 columns

#### Issue #5:

Define: The 'source' column looks too messy and clusters the table, will be dropped.

Code

```
In [28]: df_copy.drop('source', axis=1, inplace=True)
```

Test

```
In [29]: df_copy
```

Out[29]:	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	text	retweeted_status_id	retweeted_status_user_id
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56+00:00	This is Phineas. He's a mystical boy. Only eve...	NaN	NaN
1	892177421306343426	NaN	NaN	2017-08-01 00:17:27+00:00	This is Tilly. She's just checking pup on you....	NaN	NaN
2	891815181378084864	NaN	NaN	2017-07-31 00:18:03+00:00	This is Archie. He is a rare Norwegian Pouncin...	NaN	NaN
3	891689557279858688	NaN	NaN	2017-07-30 15:58:51+00:00	This is Darla. She commenced a snooze mid meal...	NaN	NaN
4	891327558926688256	NaN	NaN	2017-07-29 16:00:24+00:00	This is Franklin. He would like you to stop ca...	NaN	NaN
...	...	...	...	...	...	...	...
2052	666049248165822465	NaN	NaN	2015-11-16 00:24:50+00:00	Here we have a 1949 1st generation vulpix. Enj...	NaN	NaN
2053	666044226329800704	NaN	NaN	2015-11-16 00:04:52+00:00	This is a purebred Piers Morgan. Loves to Netf...	NaN	NaN
2054	666033412701032449	NaN	NaN	2015-11-15 23:21:54+00:00	Here is a very happy pup. Big fan of well-main...	NaN	NaN
2055	666029285002620928	NaN	NaN	2015-11-15 23:05:30+00:00	This is a western brown Mitsubishi terrier. Up...	NaN	NaN
2056	666020888022790149	NaN	NaN	2015-11-15 22:32:08+00:00	Here we have a Japanese Irish Setter. Lost eye...	NaN	NaN

1986 rows × 29 columns

## Issue #6:

Define: The type of dogs in p1, p2 and p3 column contains both lower and uppercase letters, needs to be handled.

Code:

```
In [30]: df_copy['p1'] = df_copy['p1'].str.lower()
df_copy['p2'] = df_copy['p2'].str.lower()
df_copy['p3'] = df_copy['p3'].str.lower()
```

Test:

```
In [31]: df_copy.p1.head()
```

```
Out[31]: 0    orange
1    chihuahua
2    chihuahua
3    paper_towel
4    basset
Name: p1, dtype: object
```

```
In [32]: df_copy.p2.head()
```



```
Out[32]: 0          bagel
1          pekinese
2          malamute
3  labrador_retriever
4    english_springer
Name: p2, dtype: object
```

```
In [33]: df_copy.p3.head()
```

```
Out[33]: 0          banana
1          papillon
2          kelpie
3          spatula
4  german_short-haired_pointer
Name: p3, dtype: object
```

## Issue #7:

Define: 2. Dropping the 'in\_reply\_to\_status\_id', 'retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp', and 'in\_reply\_to\_user\_id' column.

## Code

```
In [34]: df_copy.drop(df.columns[[1,2,6,7,8]], axis=1, inplace=True)
```

## Test:

```
In [35]: df_copy.head(1)
```

```
Out[35]:
```

	tweet_id	timestamp	text	expanded_urls	rating_numerator	rating_denominator	name
0	892420643555336193	2017-08-01 16:23:56+00:00	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	13	10	Phineas

1 rows × 24 columns

## Issue #8:

Define: Incorrect ratings in columns fixed.

## Code

```
In [36]: df_copy['rating_numerator'].unique()
```

```
Out[36]: array([ 13, 12, 14, 5, 11, 6, 10, 0, 84, 24, 75,
        27, 3, 7, 8, 9, 4, 165, 1776, 204, 50, 99,
        80, 45, 60, 44, 143, 121, 26, 2, 144, 88, 1,
        420], dtype=int64)
```

```
In [37]: df_copy['rating_denominator'].unique()
```

```
Out[37]: array([ 10, 70, 7, 150, 11, 170, 20, 50, 90, 80, 40, 130, 110,
        120, 2], dtype=int64)
```

```
In [38]: df_copy.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 1986 entries, 0 to 2056
Data columns (total 24 columns):
#   Column                Non-Null Count  Dtype
---  -
0   tweet_id              1986 non-null   object
1   timestamp             1986 non-null   datetime64[ns, UTC]
2   text                  1986 non-null   object
3   expanded_urls         1986 non-null   object
4   rating_numerator      1986 non-null   int64
5   rating_denominator    1986 non-null   int64
6   name                  1986 non-null   object
7   doggo                 1986 non-null   object
8   floof                 1986 non-null   object
9   pupper               1986 non-null   object
10  puppo                 1986 non-null   object
11  jpg_url               1986 non-null   object
12  img_num               1986 non-null   int64
13  p1                    1986 non-null   object
14  p1_conf               1986 non-null   float64
15  p1_dog                1986 non-null   bool
16  p2                    1986 non-null   object
17  p2_conf               1986 non-null   float64
18  p2_dog                1986 non-null   bool
19  p3                    1986 non-null   object
20  p3_conf               1986 non-null   float64
21  p3_dog                1986 non-null   bool
22  retweet_count         1986 non-null   int64
23  favorite_count        1986 non-null   int64
dtypes: bool(3), datetime64[ns, UTC](1), float64(3), int64(5), object(12)
memory usage: 347.2+ KB

```

```

In [39]: #resets the index
df_copy.reset_index(inplace=True, drop=True)

```

```

In [40]: # to check for ratings with decimals incorrectly extracted, by viewing the text column
df_copy[df_copy.text.str.contains(r"(\d+\.\d*\.\d+)")][['text', 'rating_numerator']].style.set_properties(subse

C:\Users\DELL\AppData\Local\Temp\ipykernel_6444\340324999.py:2: UserWarning: This pattern is interpreted as a r
egular expression, and has match groups. To actually get the groups, use str.extract.
  df_copy[df_copy.text.str.contains(r"(\d+\.\d*\.\d+)")][['text', 'rating_numerator']].style.set_properties(sub
set=['text'], **{'width-min': '300px'})

```

```

Out[40]:

```

		text	rating_numerator
39	This is Bella. She hopes her smile made you smile. If not, she is also offering you her favorite monkey.	13.5/10 https://t.co/qjrljlt948	5
499	This is Logan, the Chow who lived. He solemnly swears he's up to lots of good.	H*ckin magical af 9.75/10 https://t.co/yBO5wuqaPS	75
548	This is Sophie. She's a Jubilant Bush Pupper. Super h*ckin rare. Appears at random just to smile at the locals.	11.27/10 would smile back https://t.co/QFaUilHxHq	27
1367	Here we have uncovered an entire battalion of holiday puppies. Average of	11.26/10 https://t.co/eNm2S6p9BD	26

```

In [41]: # replacing the numerator ratings with the correct value
df_copy.iloc[39, 4] = 13.5
df_copy.iloc[499, 4] = 9.75
df_copy.iloc[548, 4] = 11.27
df_copy.iloc[1367, 4] = 11.26

```

```

In [42]: # returns a dataframe that matches text with multiple rating entries or not
a = df_copy.text.str.extractall(r"(\d+\d*\.\d+)")
a.head(5)

```

```

Out[42]:

```

	0
	match
0	0 13/10
1	0 13/10
2	0 12/10
3	0 13/10
4	0 12/10

```

In [43]: # returns a dataframe that matches text with multiple rating entries
match = a.query("match == 1")
match.head()

```

Out[43]: 0

match		
550	1	11/10
742	1	7/10
793	1	14/10
884	1	13/10
918	1	11/10

In [44]: *# returns the indexes of the above dataframe*  
`match.index.values.tolist()`

Out[44]: [(550, 1),  
(742, 1),  
(793, 1),  
(884, 1),  
(918, 1),  
(934, 1),  
(1055, 1),  
(1145, 1),  
(1150, 1),  
(1185, 1),  
(1200, 1),  
(1211, 1),  
(1321, 1),  
(1442, 1),  
(1476, 1),  
(1538, 1),  
(1542, 1),  
(1607, 1),  
(1647, 1),  
(1700, 1),  
(1749, 1),  
(1812, 1),  
(1849, 1),  
(1894, 1),  
(1903, 1),  
(1936, 1),  
(1965, 1)]

In [45]: `df_copy.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1986 entries, 0 to 1985
Data columns (total 24 columns):
#   Column                Non-Null Count  Dtype
---  -
0   tweet_id              1986 non-null   object
1   timestamp              1986 non-null   datetime64[ns, UTC]
2   text                   1986 non-null   object
3   expanded_urls          1986 non-null   object
4   rating_numerator       1986 non-null   float64
5   rating_denominator     1986 non-null   int64
6   name                   1986 non-null   object
7   doggo                  1986 non-null   object
8   floof                  1986 non-null   object
9   pupper                 1986 non-null   object
10  puppo                  1986 non-null   object
11  jpg_url                 1986 non-null   object
12  img_num                 1986 non-null   int64
13  p1                       1986 non-null   object
14  p1_conf                 1986 non-null   float64
15  p1_dog                  1986 non-null   bool
16  p2                       1986 non-null   object
17  p2_conf                 1986 non-null   float64
18  p2_dog                  1986 non-null   bool
19  p3                       1986 non-null   object
20  p3_conf                 1986 non-null   float64
21  p3_dog                  1986 non-null   bool
22  retweet_count           1986 non-null   int64
23  favorite_count          1986 non-null   int64
dtypes: bool(3), datetime64[ns, UTC](1), float64(4), int64(4), object(12)
memory usage: 331.8+ KB
```

In [47]: *# reading the text column visually for proper cleaning*  
`df_copy.iloc[[550, 742, 793, 884, 918, 934, 1055, 1145, 1150, 1185, 1200, 1211, 1321, 1442, 1476, 1538, 1542, 1`

Out[47]:

	text	rating_numerator	rating_denominator
550	"Yep... just as I suspected. You're not flossing." 12/10 and 11/10 for the pup not flossing <a href="https://t.co/SuXcl9B7pQ">https://t.co/SuXcl9B7pQ</a>	12.000000	10
742	This is Bookstore and Seaweed. Bookstore is tired and Seaweed is an asshole. 10/10 and 7/10 respectively <a href="https://t.co/eUGjGjjFVJ">https://t.co/eUGjGjjFVJ</a>	10.000000	10
793	After so many requests, this is Bretagne. She was the last surviving 9/11 search dog, and our second ever 14/10. RIP <a href="https://t.co/XAVDNDaVgQ">https://t.co/XAVDNDaVgQ</a>	9.000000	11
884	Happy 4/20 from the squad! 13/10 for all <a href="https://t.co/eV1diwds8a">https://t.co/eV1diwds8a</a>	4.000000	20
918	This is Bluebert. He just saw that both #FinalFur match ups are split 50/50. Amazed af. 11/10 <a href="https://t.co/Kky1DPG4iq">https://t.co/Kky1DPG4iq</a>	50.000000	50
934	Meet Travis and Flurp. Travis is pretty chill but Flurp can't lie down properly. 10/10 & 8/10 get it together Flurp <a href="https://t.co/AkzI5ynMmE">https://t.co/AkzI5ynMmE</a>	10.000000	10
1055	This is Socks. That water pup w the super legs just splashed him. Socks did not appreciate that. 9/10 and 2/10 <a href="https://t.co/8rc5I22bBf">https://t.co/8rc5I22bBf</a>	9.000000	10
1145	This may be the greatest video I've ever been sent. 4/10 for Charles the puppy, 13/10 overall. (Vid by @stevenxx_) <a href="https://t.co/uaJmNgXR2P">https://t.co/uaJmNgXR2P</a>	4.000000	10
1150	Meet Oliwier. He takes killer selfies. Has a dog of his own. It leaps at random & can't bark for shit. 10/10 & 5/10 <a href="https://t.co/6NgsQJuSBJ">https://t.co/6NgsQJuSBJ</a>	10.000000	10
1185	When bae says they can't go out but you see them with someone else that same night. 5/10 & 10/10 for heartbroken pup <a href="https://t.co/aenk0KpoWM">https://t.co/aenk0KpoWM</a>	5.000000	10
1200	This is Eriq. His friend just reminded him of last year's super bowl. Not cool friend 10/10 for Eriq 6/10 for friend <a href="https://t.co/PIEXTofdpf">https://t.co/PIEXTofdpf</a>	10.000000	10
1211	Meet Fynn & Taco. Fynn is an all-powerful leaf lord and Taco is in the wrong place at the wrong time. 11/10 & 10/10 <a href="https://t.co/MuqHPvtL8c">https://t.co/MuqHPvtL8c</a>	11.000000	10
1321	This is Darrel. He just robbed a 7/11 and is in a high speed police chase. Was just spotted by the helicopter 10/10 <a href="https://t.co/7EsP8LmSp5">https://t.co/7EsP8LmSp5</a>	7.000000	11
1442	Meet Tassy & Bee. Tassy is pretty chill, but Bee is convinced the Ruffles are haunted. 10/10 & 11/10 respectively <a href="https://t.co/fgORpmTN9C">https://t.co/fgORpmTN9C</a>	10.000000	10
1476	These two pups just met and have instantly bonded. Spectacular scene. Mesmerizing af. 10/10 and 7/10 for blue dog <a href="https://t.co/gwryaJO4tC">https://t.co/gwryaJO4tC</a>	10.000000	10
1538	Meet Rufio. He is unaware of the pink legless pupper wrapped around him. Might want to get that checked 10/10 & 4/10 <a href="https://t.co/KNfLnYPmYh">https://t.co/KNfLnYPmYh</a>	10.000000	10
1542	Two gorgeous dogs here. Little waddling dog is a rebel. Refuses to look at camera. Must be a preteen. 5/10 & 8/10 <a href="https://t.co/YPfw7oahbD">https://t.co/YPfw7oahbD</a>	5.000000	10
1607	Meet Eve. She's a raging alcoholic 8/10 (would b 11/10 but pupper alcoholism is a tragic issue that I can't condone) <a href="https://t.co/U36HYQlijg">https://t.co/U36HYQlijg</a>	8.000000	10
1647	10/10 for dog. 7/10 for cat. 12/10 for human. Much skill. Would pet all <a href="https://t.co/uhx5gfpX5k">https://t.co/uhx5gfpX5k</a>	10.000000	10
1700	Meet Holly. She's trying to teach small human-like pup about blocks but he's not paying attention smh. 11/10 & 8/10 <a href="https://t.co/RcksaUrGNu">https://t.co/RcksaUrGNu</a>	11.000000	10
1749	Meet Hank and Sully. Hank is very proud of the pumpkin they found and Sully doesn't give a shit. 11/10 and 8/10 <a href="https://t.co/cwoP1ftbrj">https://t.co/cwoP1ftbrj</a>	11.000000	10
1812	Here we have Pancho and Peaches. Pancho is a Condoleezza Gryffindor, and Peaches is just an asshole. 10/10 & 7/10 <a href="https://t.co/Lh1BsJrWpP">https://t.co/Lh1BsJrWpP</a>	10.000000	10
1849	This is Spark. He's nervous. Other dog hasn't moved in a while. Won't come when called. Doesn't fetch well 8/10&11/10 <a href="https://t.co/stEodX9Aba">https://t.co/stEodX9Aba</a>	8.000000	10
1903	Two dogs in this one. Both are rare Jujitsu Pythagoreans. One slightly whiter than other. Long legs. 7/10 and 8/10 <a href="https://t.co/ITxxcc4v9y">https://t.co/ITxxcc4v9y</a>	7.000000	10
1936	These are Peruvian Feldspars. Their names are Cupit and Prencer. Both resemble Rand Paul. Sick outfits 10/10 & 10/10 <a href="https://t.co/ZnEMHBsAs1">https://t.co/ZnEMHBsAs1</a>	10.000000	10
1965	This is an Albanian 3 1/2 legged Episcopalian. Loves well-polished hardwood flooring. Penis on the collar. 9/10 <a href="https://t.co/d9NcXFKwLv">https://t.co/d9NcXFKwLv</a>	1.000000	2

In [49]:

```
# replacing the numerator and denominator ratings with the correct value
df_copy.iloc[793, 4] = 14
df_copy.iloc[793, 5] = 10

df_copy.iloc[884, 4] = 13
df_copy.iloc[884, 5] = 10

df_copy.iloc[918, 4] = 11
df_copy.iloc[918, 5] = 10

df_copy.iloc[1321, 4] = 10
df_copy.iloc[1321, 5] = 10

df_copy.iloc[1965, 4] = 9
df_copy.iloc[1965, 5] = 10
```

Test:

In [50]:

```
df_copy.iloc[[39, 499, 548, 1367, 550, 742, 793, 884, 918, 934, 1055, 1145, 1150, 1185, 1200, 1211, 1321, 1442, 14
```

Out[50]:

text	rating_numerator	rating_denominator
------	------------------	--------------------

39	This is Bella. She hopes her smile made you smile. If not, she is also offering you her favorite monkey.	13.5/10 <a href="https://t.co/qjrlij948">https://t.co/qjrlij948</a>	13.500000	10
499	This is Logan, the Chow who lived. He solemnly swears he's up to lots of good. H*ckin magical af 9.75/10 <a href="https://t.co/yBO5wuqaPS">https://t.co/yBO5wuqaPS</a>		9.750000	10
548	This is Sophie. She's a Jubilant Bush Pupper. Super h*ckin rare. Appears at random just to smile at the locals. 11.27/10 would smile back <a href="https://t.co/QFaUilHxHq">https://t.co/QFaUilHxHq</a>		11.270000	10
1367	Here we have uncovered an entire battalion of holiday puppers. Average of 11.26/10 <a href="https://t.co/eNm2S6p9BD">https://t.co/eNm2S6p9BD</a>		11.260000	10
550	"Yep... just as I suspected. You're not flossing." 12/10 and 11/10 for the pup not flossing <a href="https://t.co/SuXcl9B7pQ">https://t.co/SuXcl9B7pQ</a>		12.000000	10
742	This is Bookstore and Seaweed. Bookstore is tired and Seaweed is an asshole. 10/10 and 7/10 respectively <a href="https://t.co/eUGjGjFVJ">https://t.co/eUGjGjFVJ</a>		10.000000	10
793	After so many requests, this is Bretagne. She was the last surviving 9/11 search dog, and our second ever 14/10. RIP <a href="https://t.co/XAVDNDaVgQ">https://t.co/XAVDNDaVgQ</a>		14.000000	10
884	Happy 4/20 from the squad! 13/10 for all <a href="https://t.co/eV1diwds8a">https://t.co/eV1diwds8a</a>		13.000000	10
918	This is Bluebert. He just saw that both #FinalFur match ups are split 50/50. Amazed af. 11/10 <a href="https://t.co/Kky1DPG4iq">https://t.co/Kky1DPG4iq</a>		11.000000	10
934	Meet Travis and Flurp. Travis is pretty chill but Flurp can't lie down properly. 10/10 & 8/10 get it together Flurp <a href="https://t.co/AkzI5ynMmE">https://t.co/AkzI5ynMmE</a>		10.000000	10
1055	This is Socks. That water pup w the super legs just splashed him. Socks did not appreciate that. 9/10 and 2/10 <a href="https://t.co/8rc5l22bBf">https://t.co/8rc5l22bBf</a>		9.000000	10
1145	This may be the greatest video I've ever been sent. 4/10 for Charles the puppy, 13/10 overall. (Vid by @stevenxx_) <a href="https://t.co/uaJmNgXR2P">https://t.co/uaJmNgXR2P</a>		4.000000	10
1150	Meet Oliwier. He takes killer selfies. Has a dog of his own. It leaps at random & can't bark for shit. 10/10 & 5/10 <a href="https://t.co/6NgsQJuSBJ">https://t.co/6NgsQJuSBJ</a>		10.000000	10
1185	When bae says they can't go out but you see them with someone else that same night. 5/10 & 10/10 for heartbroken pup <a href="https://t.co/aenk0KpoWM">https://t.co/aenk0KpoWM</a>		5.000000	10
1200	This is Eriq. His friend just reminded him of last year's super bowl. Not cool friend 10/10 for Eriq 6/10 for friend <a href="https://t.co/PIEXTofdpf">https://t.co/PIEXTofdpf</a>		10.000000	10
1211	Meet Fynn & Taco. Fynn is an all-powerful leaf lord and Taco is in the wrong place at the wrong time. 11/10 & 10/10 <a href="https://t.co/MuqHPvtL8c">https://t.co/MuqHPvtL8c</a>		11.000000	10
1321	This is Darrel. He just robbed a 7/11 and is in a high speed police chase. Was just spotted by the helicopter 10/10 <a href="https://t.co/7EsP8LmSp5">https://t.co/7EsP8LmSp5</a>		10.000000	10
1442	Meet Tassy & Bee. Tassy is pretty chill, but Bee is convinced the Ruffles are haunted. 10/10 & 11/10 respectively <a href="https://t.co/fgORpmTN9C">https://t.co/fgORpmTN9C</a>		10.000000	10
1476	These two pups just met and have instantly bonded. Spectacular scene. Mesmerizing af. 10/10 and 7/10 for blue dog <a href="https://t.co/gwryaJO4tC">https://t.co/gwryaJO4tC</a>		10.000000	10
1538	Meet Rufio. He is unaware of the pink legless pupper wrapped around him. Might want to get that checked 10/10 & 4/10 <a href="https://t.co/KNfLnYPmYh">https://t.co/KNfLnYPmYh</a>		10.000000	10
1542	Two gorgeous dogs here. Little waddling dog is a rebel. Refuses to look at camera. Must be a preteen. 5/10 & 8/10 <a href="https://t.co/YPfw7oahbD">https://t.co/YPfw7oahbD</a>		5.000000	10
1607	Meet Eve. She's a raging alcoholic 8/10 (would b 11/10 but pupper alcoholism is a tragic issue that I can't condone) <a href="https://t.co/U36HYQlijg">https://t.co/U36HYQlijg</a>		8.000000	10
1647	10/10 for dog. 7/10 for cat. 12/10 for human. Much skill. Would pet all <a href="https://t.co/uhx5gfp5k">https://t.co/uhx5gfp5k</a>		10.000000	10
1700	Meet Holly. She's trying to teach small human-like pup about blocks but he's not paying attention smh. 11/10 & 8/10 <a href="https://t.co/RksaUrGNu">https://t.co/RksaUrGNu</a>		11.000000	10
1749	Meet Hank and Sully. Hank is very proud of the pumpkin they found and Sully doesn't give a shit. 11/10 and 8/10 <a href="https://t.co/cwoP1ftbrj">https://t.co/cwoP1ftbrj</a>		11.000000	10
1812	Here we have Pancho and Peaches. Pancho is a Condoleezza Gryffindor, and Peaches is just an asshole. 10/10 & 7/10 <a href="https://t.co/Lh1BsJrWPp">https://t.co/Lh1BsJrWPp</a>		10.000000	10
1849	This is Spark. He's nervous. Other dog hasn't moved in a while. Won't come when called. Doesn't fetch well 8/10 & 1/10 <a href="https://t.co/stEodX9Aba">https://t.co/stEodX9Aba</a>		8.000000	10
1903	Two dogs in this one. Both are rare Jujitsu Pythagoreans. One slightly whiter than other. Long legs. 7/10 and 8/10 <a href="https://t.co/ITxxcc4v9y">https://t.co/ITxxcc4v9y</a>		7.000000	10
1936	These are Peruvian Feldspars. Their names are Cupit and Prencer. Both resemble Rand Paul. Sick outfits 10/10 & 10/10 <a href="https://t.co/ZnEMHBsAs1">https://t.co/ZnEMHBsAs1</a>		10.000000	10

In [51]: `df_copy.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1986 entries, 0 to 1985
Data columns (total 24 columns):
#   Column                Non-Null Count  Dtype
---  -
0   tweet_id              1986 non-null   object
1   timestamp             1986 non-null   datetime64[ns, UTC]
2   text                  1986 non-null   object
3   expanded_urls         1986 non-null   object
4   rating_numerator      1986 non-null   float64
5   rating_denominator    1986 non-null   int64
6   name                  1986 non-null   object
7   doggo                 1986 non-null   object
8   floof                 1986 non-null   object
9   pupper               1986 non-null   object
10  puppo                 1986 non-null   object
11  jpg_url               1986 non-null   object
12  img_num               1986 non-null   int64
13  p1                    1986 non-null   object
14  p1_conf               1986 non-null   float64
15  p1_dog                1986 non-null   bool
16  p2                    1986 non-null   object
17  p2_conf               1986 non-null   float64
18  p2_dog                1986 non-null   bool
19  p3                    1986 non-null   object
20  p3_conf               1986 non-null   float64
21  p3_dog                1986 non-null   bool
22  retweet_count         1986 non-null   int64
23  favorite_count        1986 non-null   int64
dtypes: bool(3), datetime64[ns, UTC](1), float64(4), int64(4), object(12)
memory usage: 331.8+ KB
```

The rating numerator column is already in data type float.

## Tidiness Issues

### Issue #9:

Define: The 'doggo', 'floof', 'pupper', 'puppo' column should not be a column because it is an observation, and will be made a new column called 'dog\_stages'

Code:

In [52]: `# replaces all 'none' values in each specified columns with empty values`

```
df_copy.doggo.replace('None', '', inplace=True)
df_copy.floof.replace('None', '', inplace=True)
df_copy.pupper.replace('None', '', inplace=True)
df_copy.puppo.replace('None', '', inplace=True)
```

In [53]: `# concatenate the doggo, floof, pupper and puppo column into one named 'dog_stage'`

```
df_copy['dog_stage'] = df_copy.doggo + df_copy.floof + df_copy.pupper + df_copy.puppo
df_copy.dog_stage.value_counts()
```

Out[53]:

	1681
pupper	203
doggo	62
puppo	22
doggopupper	9
floofer	7
doggopuppo	1
doggofloofer	1

Name: dog\_stage, dtype: int64

In [54]: `# replace double entry values with the correct dog types seperated by a comma.`

```
df_copy.loc[df_copy.dog_stage == 'doggopupper', 'dog_stage'] = 'doggo,pupper'
df_copy.loc[df_copy.dog_stage == 'doggopuppo', 'dog_stage'] = 'doggo,puppo'
df_copy.loc[df_copy.dog_stage == 'doggofloofer', 'dog_stage'] = 'doggo,floofer'
```

In [55]: `# returns the value count of the dog stage column`

```
df_copy.dog_stage.value_counts()
```

```
Out[55]: pupper      1681
         doggo      203
         puppo      62
         doggo,pupper  22
         floofer     9
         doggo,puppo  7
         doggo,floofer 1
         doggo,floofer 1
         Name: dog_stage, dtype: int64
```

```
In [56]: # drop the specifed dog type columns
df_copy.drop(['doggo', 'floof', 'pupper', 'puppo'], axis=1, inplace=True)
```

```
In [57]: # replace other irrelevant values with nan values
df_copy['dog_stage'] = df_copy['dog_stage'].replace('', np.nan)
df_copy['dog_stage'] = df_copy['dog_stage'].replace('49.04', np.nan)
df_copy['dog_stage'] = df_copy['dog_stage'].replace('40', np.nan)
```

Test:

```
In [58]: df_copy.head(10)
```

```
Out[58]:
```

	tweet_id	timestamp	text	expanded_urls	rating_numerator	rating_denominator	name
0	892420643555336193	2017-08-01 16:23:56+00:00	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	13.0	10	Phinea
1	892177421306343426	2017-08-01 00:17:27+00:00	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	13.0	10	Till
2	891815181378084864	2017-07-31 00:18:03+00:00	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/891815181...	12.0	10	Archie
3	891689557279858688	2017-07-30 15:58:51+00:00	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/891689557...	13.0	10	Darl
4	891327558926688256	2017-07-29 16:00:24+00:00	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/891327558...	12.0	10	Franklin
5	891087950875897856	2017-07-29 00:08:17+00:00	Here we have a majestic great white breaching ...	https://twitter.com/dog_rates/status/891087950...	13.0	10	None
6	890971913173991426	2017-07-28 16:27:12+00:00	Meet Jax. He enjoys ice cream so much he gets ...	https://gofundme.com/ydvme-surgery-for-jax,ht...	13.0	10	Ja
7	890729181411237888	2017-07-28 00:22:40+00:00	When you watch your owner call another dog a g...	https://twitter.com/dog_rates/status/890729181...	13.0	10	None
8	890609185150312448	2017-07-27 16:25:51+00:00	This is Zoey. She doesn't want to be one of th...	https://twitter.com/dog_rates/status/890609185...	13.0	10	Zoe
9	890240255349198849	2017-07-26 15:59:51+00:00	This is Cassie. She is a college pup. Studying...	https://twitter.com/dog_rates/status/890240255...	14.0	10	Cassie

10 rows × 21 columns

## Issue #10:

Define: The three datasets will be merged into one, because it is relational data.

Code:

The dataset was merged before the cleaning operation began. The code to the merging can be found in cells 9, 10 and 11 of this notebook.

Test:

```
In [59]: df.head(1)
```

```
Out[59]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	timestamp	source	text	retweeted_status
0	892420643555336193	NaN	NaN	2017-08-01 16:23:56 +0000	href="http://twitter.com/download/iphone" r...	This is Phineas. He's a mystical boy. Only eve...	N

1 rows × 30 columns

## Storing Data

Saving the gathered, assessed, and cleaned master dataset to a CSV file named "twitter\_archive\_master.csv".

```
In [60]: # save the clean dataset into a csv file
df_copy.to_csv("twitter_archive_master.csv", index=False)
```

```
In [61]: df_clean = pd.read_csv("twitter_archive_master.csv")
```

```
In [62]: # returns the first 10 rows of the cleaned dataset
df_clean.head(10)
```



	tweet_id	timestamp	text	expanded_urls	rating_numerator	rating_denominator	name
0	892420643555336193	2017-08-01 16:23:56+00:00	This is Phineas. He's a mystical boy. Only eve...	https://twitter.com/dog_rates/status/892420643...	13.0	10	Phinea
1	892177421306343426	2017-08-01 00:17:27+00:00	This is Tilly. She's just checking pup on you....	https://twitter.com/dog_rates/status/892177421...	13.0	10	Till
2	891815181378084864	2017-07-31 00:18:03+00:00	This is Archie. He is a rare Norwegian Pouncin...	https://twitter.com/dog_rates/status/891815181...	12.0	10	Archie
3	891689557279858688	2017-07-30 15:58:51+00:00	This is Darla. She commenced a snooze mid meal...	https://twitter.com/dog_rates/status/891689557...	13.0	10	Darla
4	891327558926688256	2017-07-29 16:00:24+00:00	This is Franklin. He would like you to stop ca...	https://twitter.com/dog_rates/status/891327558...	12.0	10	Franklin
5	891087950875897856	2017-07-29 00:08:17+00:00	Here we have a majestic great white breaching ...	https://twitter.com/dog_rates/status/891087950...	13.0	10	None
6	890971913173991426	2017-07-28 16:27:12+00:00	Meet Jax. He enjoys ice cream so much he gets ...	https://gofundme.com/ydvmve-surgery-for-jax,ht...	13.0	10	Jax
7	890729181411237888	2017-07-28 00:22:40+00:00	When you watch your owner call another dog a g...	https://twitter.com/dog_rates/status/890729181...	13.0	10	None
8	890609185150312448	2017-07-27 16:25:51+00:00	This is Zoey. She doesn't want to be one of th...	https://twitter.com/dog_rates/status/890609185...	13.0	10	Zoey
9	890240255349198849	2017-07-26 15:59:51+00:00	This is Cassie. She is a college pup. Studying...	https://twitter.com/dog_rates/status/890240255...	14.0	10	Cassie

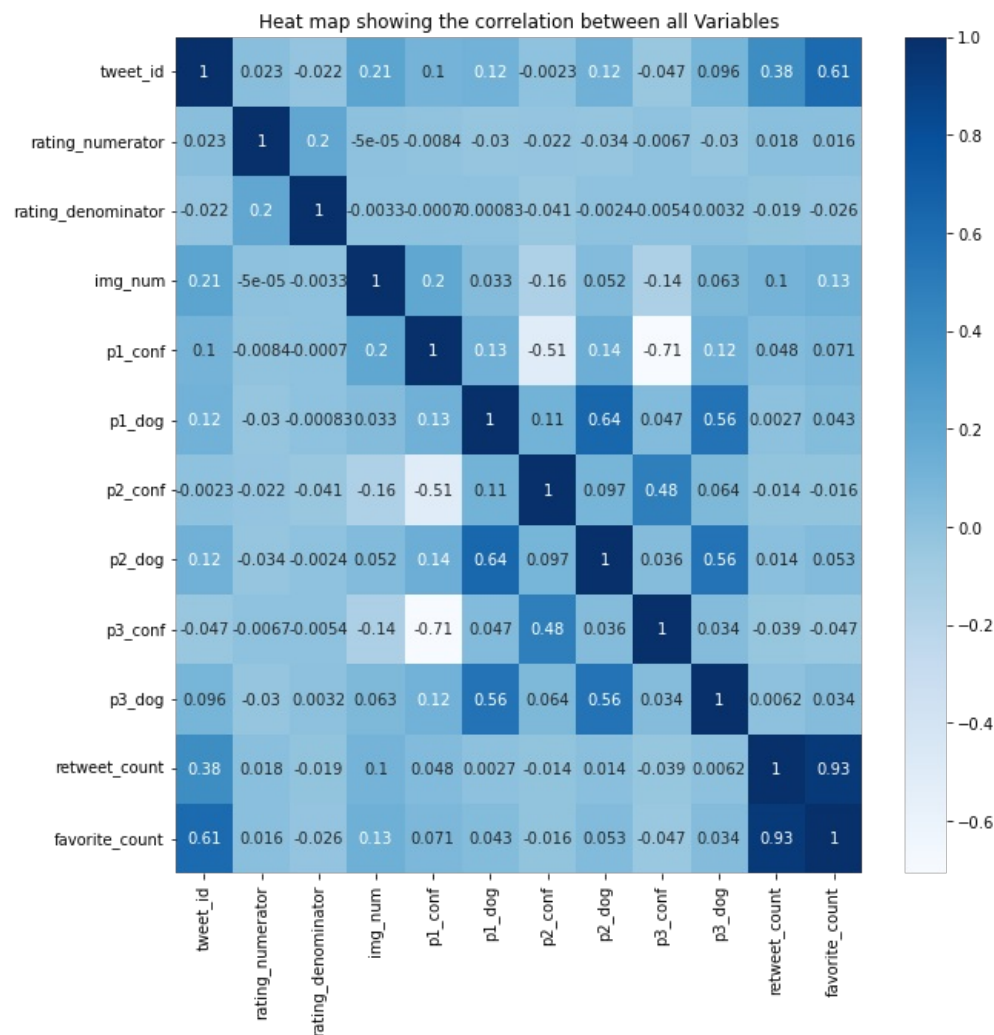
In this section, I analyzed and visualized my wrangled and clean data. I produced **three (3) insights** and **two (2) visualization**.

```
# quick statistical summary of the clean dataset
df_clean.describe()
```

	tweet_id	rating_numerator	rating_denominator	img_num	p1_conf	p2_conf	p3_conf	retweet_count	favorite_co
count	1.986000e+03	1986.000000	1986.000000	1986.000000	1986.000000	1.986000e+03	1.986000e+03	1986.000000	1986.000000
mean	7.356142e+17	12.231007	10.512085	1.203424	0.593452	1.344853e-01	6.034994e-02	2242.210977	7706.950
std	6.740686e+16	41.544680	7.276068	0.561492	0.271961	1.005944e-01	5.091948e-02	4016.627067	11370.339
min	6.660209e+17	0.000000	7.000000	1.000000	0.044333	1.011300e-08	1.740170e-10	11.000000	66.000000
25%	6.758214e+17	10.000000	10.000000	1.000000	0.362656	5.407533e-02	1.624755e-02	494.500000	1636.250000
50%	7.082494e+17	11.000000	10.000000	1.000000	0.587357	1.175370e-01	4.952715e-02	1079.000000	3463.000000
75%	7.873791e+17	12.000000	10.000000	1.000000	0.844920	1.951377e-01	9.166433e-02	2556.750000	9556.250000
max	8.924206e+17	1776.000000	170.000000	4.000000	1.000000	4.880140e-01	2.734190e-01	70689.000000	144829.000000

```
# plots a heat map showing the correlation between all the variables
plt.figure(figsize=(10,10))
```

```
sns.heatmap(df_clean.corr(),cbar=True,annot=True,cmap='Blues')
plt.title('Heat map showing the correlation between all Variables');
```



## Insights:

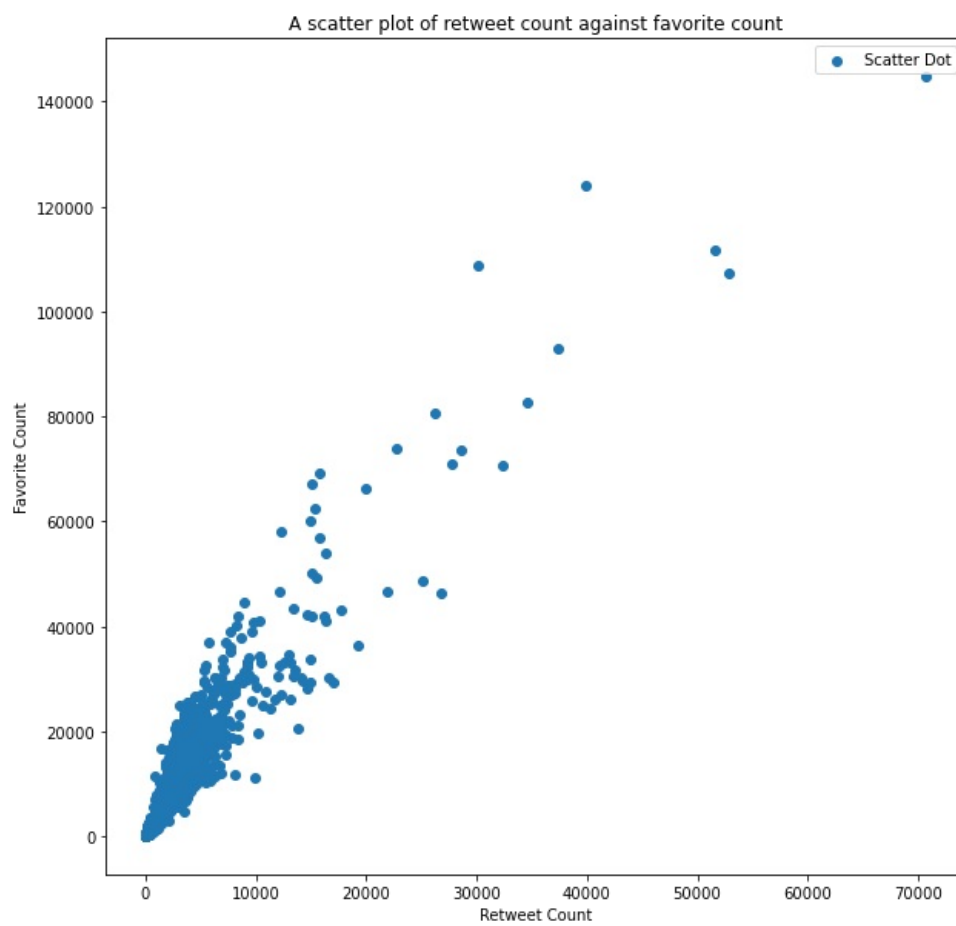
1. The value of the minimum, first quartile, median, third quartile and the maximum favorite count is higher than that of the respective retweet count, I can infer that people generally like to favorite a tweet than retweet it.
2. From the heat map displayed above, we can see that there is a strong correlation between the retweet\_count and favorite count columns, with correlation value of 0.93
3. The standard deviation of the rating\_numerator column is 41.544680.

## Visualization

1. Is the relationship between the retweet\_count and the favorite\_count a positive or negative one?

```
In [65]: # returns a scatter plot showing the relationship between the retweet_count and the favorite_count
```

```
plt.figure(figsize=(10,10))
plt.scatter(x='retweet_count',y='favorite_count',data=df_clean, label='Scatter Dot')
plt.title('A scatter plot of retweet count against favorite count')
plt.xlabel('Retweet Count')
plt.ylabel('Favorite Count')
plt.legend(loc='best');
```



There is a positive correlation between them.

In [ ]: