

# wrangle\_act

December 2, 2019

## 1 WE NOW BEGIN OUR DATA WRANGLING JOURNEY.....

```
[90]: # We first import all the required libraries.
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
```

### 1.1 GATHERING THE DATA

```
[91]: # We now import our provided twitter archive file with the help of pandas.
dog_ratings = pd.read_csv('twitter-archive-enhanced.csv')
```

```
[92]: dog_ratings.head()
```

```
[92]:
```

	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

```

[93]: *# Now we will programatically download the image prediction tsv file from udacity's server using requests library.*

```

url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/
↳599fd2ad_image-predictions/image-predictions.tsv'
response = requests.get(url)
with open("image_predictions.tsv", mode = 'wb') as outfile:
    outfile.write(response.content)

```

[94]: *# We now read image predictions file into a df.*

```

image_predictions = pd.read_csv('image_predictions.tsv', sep = '\t', encoding =
↳'utf-8')
image_predictions.head()

```

[94]:

	tweet_id	jpg_url
0	666020888022790149	https://pbs.twimg.com/media/CT4udn0WwAA0aMy.jpg
1	666029285002620928	https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg

```

2 666033412701032449 https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg
3 666044226329800704 https://pbs.twimg.com/media/CT5Dr8HUEAA-lEu.jpg
4 666049248165822465 https://pbs.twimg.com/media/CT5IQmsXIAAKY4A.jpg

```

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

	p2_conf	p2_dog	p3	p3_conf	p3_dog
0	0.156665	True	Shetland_sheepdog	0.061428	True
1	0.074192	True	Rhodesian_ridgeback	0.072010	True
2	0.138584	True	bloodhound	0.116197	True
3	0.360687	True	miniature_pinscher	0.222752	True
4	0.243682	True	Doberman	0.154629	True

```

[95]: # Now we will gather retweet count and favourite count at minimum from twitter
      ↪API.
      # Query Twitter API for each tweet in the Twitter archive and save JSON in a
      ↪text file
      # These are hidden to comply with Twitter's API terms and conditions
      consumer_key = 'P66aFQDJeBss9EORraUg5CUCf'
      consumer_secret = 'bUxnTS4JT5qfVJlfzdrSy8VHvFdjNhRLyLsbKlnn0qf3qdS7xm'
      access_token = '760894336099688448-ECaKIkrsCGdyrHU56TEBzk3POPncpyk'
      access_secret = 'QAnYI2sjEPsW8xyrYP4EUpbLHc5AGyGjMEuxP96nMyCM8'

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

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

```

```

[96]: # Query Twitter's API for JSON data for each tweet ID in the Twitter archive
      tweet_ids = dog_ratings.tweet_id.values
      len(tweet_ids)

      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:
          for tweet_id in tweet_ids:
              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.TweepError 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  
Success  
34: 885984800019947520  
Success  
35: 885528943205470208  
Success  
36: 885518971528720385  
Success  
37: 885311592912609280  
Success  
38: 885167619883638784  
Success  
39: 884925521741709313  
Success  
40: 884876753390489601  
Success  
41: 884562892145688576  
Success  
42: 884441805382717440  
Success

43: 884247878851493888  
Success  
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  
58: 881268444196462592  
Success  
59: 880935762899988482  
Success  
60: 880872448815771648  
Success  
61: 880465832366813184  
Success  
62: 880221127280381952  
Success  
63: 880095782870896641  
Success  
64: 879862464715927552  
Success  
65: 879674319642796034  
Success  
66: 879492040517615616  
Success

67: 879415818425184262  
Success  
68: 879376492567855104  
Success  
69: 879130579576475649  
Success  
70: 879050749262655488  
Success  
71: 879008229531029506  
Success  
72: 878776093423087618  
Success  
73: 878604707211726852  
Success  
74: 878404777348136964  
Success  
75: 878316110768087041  
Success  
76: 878281511006478336  
Success  
77: 878057613040115712  
Success  
78: 877736472329191424  
Success  
79: 877611172832227328  
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Success  
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Success  
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84: 876537666061221889  
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Success  
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Success  
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Success

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Success  
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Success  
93: 874296783580663808  
Success  
94: 874057562936811520  
Success  
95: 874012996292530176  
Success  
96: 873697596434513921  
Fail  
97: 873580283840344065  
Success  
98: 873337748698140672  
Success  
99: 873213775632977920  
Success  
100: 872967104147763200  
Success  
101: 872820683541237760  
Success  
102: 872668790621863937  
Fail  
103: 872620804844003328  
Success  
104: 872486979161796608  
Success  
105: 872261713294495745  
Fail  
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117: 870308999962521604  
Success  
118: 870063196459192321  
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119: 869988702071779329  
Fail  
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121: 869702957897576449  
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122: 869596645499047938  
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123: 869227993411051520  
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124: 868880397819494401  
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125: 868639477480148993  
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255: 844580511645339650  
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256: 844223788422217728  
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262: 842846295480000512  
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296: 837471256429613056  
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298: 837110210464448512  
Success  
299: 837012587749474308  
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Success  
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304: 836397794269200385  
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305: 836380477523124226  
Success  
306: 836260088725786625  
Success



307: 836001077879255040  
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Success  
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Success  
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Success  
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Success  
316: 835152434251116546  
Success  
317: 834931633769889797  
Success  
318: 834786237630337024  
Success  
319: 834574053763584002  
Success  
320: 834477809192075265  
Success  
321: 834458053273591808  
Success  
322: 834209720923721728  
Success  
323: 834167344700198914  
Success  
324: 834089966724603904  
Success  
325: 834086379323871233  
Success  
326: 833863086058651648  
Success  
327: 833826103416520705  
Success  
328: 833732339549220864  
Success  
329: 833722901757046785  
Success  
330: 833479644947025920  
Success

331: 833124694597443584  
Success  
332: 832998151111966721  
Success  
333: 832769181346996225  
Success  
334: 832757312314028032  
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Success  
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Success  
342: 832215726631055365  
Success  
343: 832088576586297345  
Success  
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Success  
345: 832032802820481025  
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347: 831926988323639298  
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348: 831911600680497154  
Success  
349: 831670449226514432  
Success  
350: 831650051525054464  
Success  
351: 831552930092285952  
Success  
352: 831322785565769729  
Success  
353: 831315979191906304  
Success  
354: 831309418084069378  
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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  
 1917.249305065  
 {888202515573088257: TweepError(['code': 144, 'message': 'No status found with that ID.']), 873697596434513921: TweepError(['code': 144, 'message': 'No status found with that ID.']), 872668790621863937: TweepError(['code': 144, 'message': 'No status found with that ID.']), 872261713294495745: TweepError(['code': 144, 'message': 'No status found with that ID.']), 869988702071779329: TweepError(['code': 144, 'message': 'No status found with that ID.']), 866816280283807744: TweepError(['code': 144, 'message': 'No status found with that ID.']), 861769973181624320: TweepError(['code': 144, 'message': 'No status found with that ID.']), 856602993587888130: TweepError(['code': 144, 'message': 'No status found with that ID.']), 851953902622658560: TweepError(['code': 144, 'message': 'No status found with that ID.']), 845459076796616705: TweepError(['code': 144, 'message': 'No status found with that ID.']), 844704788403113984: TweepError(['code': 144, 'message': 'No status found with that ID.']), 842892208864923648: TweepError(['code': 144, 'message': 'No status found with that ID.']), 837366284874571778: TweepError(['code': 144, 'message': 'No status found with that ID.']), 837012587749474308: TweepError(['code': 144, 'message': 'No status found with that ID.']), 829374341691346946: TweepError(['code': 144, 'message': 'No status found with that ID.']), 827228250799742977: TweepError(['code': 144, 'message': 'No status found with that ID.']), 812747805718642688: TweepError(['code': 144, 'message': 'No status found with that ID.']), 802247111496568832: TweepError(['code': 144, 'message': 'No status found with that ID.']), 779123168116150273: TweepError(['code': 144, 'message': 'No status found with that ID.']), 775096608509886464: TweepError(['code': 144, 'message': 'No status found with that ID.']), 770743923962707968: TweepError(['code': 144, 'message': 'No status found with that ID.']), 754011816964026368: TweepError(['code': 144, 'message': 'No

```
status found with that ID.']],), 680055455951884288: TweepError([{'code': 144,
'message': 'No status found with that ID.'}]),)
```

```
[ ]:
```

```
[97]: # now we will open the file tweet_json.txt and read it line by line into the
      ↪data frame.
      # load json data into pandas DataFrame
      text_file_path = 'tweet_json.txt'
      tweet_json_df = pd.read_json(text_file_path, lines = True)
      # extract columns that pertain to like and favorite counts
      columns_of_interest = ['id', 'retweet_count', 'favorite_count']
      tweet_likes = tweet_json_df[columns_of_interest]
```

## 1.2 ASSESSING THE DATA

```
[98]: # we will now visually assess dog_ratings df for Quality (Dirty Data) and
      ↪tidiness(messy data) issues.
      dog_ratings.head()
```

```
[98]:
```

	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

```
[99]: dog_ratings.sample(5)
```

```
[99]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id \
927	754856583969079297	NaN	NaN
2048	671511350426865664	NaN	NaN
2189	668967877119254528	6.689207e+17	21435658.0
1397	699779630832685056	NaN	NaN
899	758828659922702336	NaN	NaN

	timestamp \
927	2016-07-18 01:53:28 +0000
2048	2015-12-01 02:09:16 +0000
2189	2015-11-24 01:42:25 +0000
1397	2016-02-17 02:17:19 +0000
899	2016-07-29 00:57:05 +0000

	source \
927	<a href="http://twitter.com/download/iphone" r...
2048	<a href="http://twitter.com/download/iphone" r...
2189	<a href="http://twitter.com/download/iphone" r...
1397	<a href="http://twitter.com/download/iphone" r...
899	<a href="http://twitter.com/download/iphone" r...

	text	retweeted_status_id \
--	------	-----------------------



927	This is Winnie. She's not a fan of the fast mo...	NaN
2048	Say hello to Hammond. He's just a wee lil pup...	NaN
2189	12/10 good shit Bubka\n@wane15	NaN
1397	Take all my money. 10/10 https://t.co/B28ebc5LzQ	NaN
899	This doggo is just waiting for someone to be p...	NaN

	retweeted_status_user_id	retweeted_status_timestamp	\
927	NaN	NaN	
2048	NaN	NaN	
2189	NaN	NaN	
1397	NaN	NaN	
899	NaN	NaN	

	expanded_urls	rating_numerator	\
927	https://twitter.com/dog_rates/status/754856583...	11	
2048	https://twitter.com/dog_rates/status/671511350...	8	
2189	NaN	12	
1397	https://twitter.com/dog_rates/status/699779630...	10	
899	https://twitter.com/dog_rates/status/758828659...	13	

	rating_denominator	name	doggo	floofer	pupper	puppo
927	10	Winnie	None	None	None	None
2048	10	Hammond	None	None	None	None
2189	10	None	None	None	None	None
1397	10	None	None	None	None	None
899	10	None	doggo	None	None	None

```
[100]: # let us visually assess image_predictions for quality and tidiness issues.
image_predictions.head()
```

```
[100]:
```

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

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

	p2_conf	p2_dog	p3	p3_conf	p3_dog
0	0.156665	True	Shetland_sheepdog	0.061428	True
1	0.074192	True	Rhodesian_ridgeback	0.072010	True

2	0.138584	True	bloodhound	0.116197	True
3	0.360687	True	miniature_pinscher	0.222752	True
4	0.243682	True	Doberman	0.154629	True

```
[101]: image_predictions.sample(5)
```

```
[101]:
```

	tweet_id	jpg_url	\
439	674436901579923456	https://pbs.twimg.com/media/CVwUyM9WwAAGDjv.jpg	
1695	816336735214911488	https://pbs.twimg.com/media/C1Q17WdWEAAjKF0.jpg	
1177	737800304142471168	https://pbs.twimg.com/media/Cj0xdMBVAAEbDHP.jpg	
197	669603084620980224	https://pbs.twimg.com/media/CUroc7QW4AATiff.jpg	
983	707411934438625280	https://pbs.twimg.com/media/CdE7ZktXIAEiWLj.jpg	

	img_num	p1	p1_conf	p1_dog	p2	\
439	1	acorn_squash	0.375392	False	Shih-Tzu	
1695	1	Labrador_retriever	0.919330	True	kuvasz	
1177	1	malamute	0.374682	True	Norwegian_elkhound	
197	1	Maltese_dog	0.659619	True	Tibetan_terrier	
983	1	Lakeland_terrier	0.738277	True	Airedale	

	p2_conf	p2_dog	p3	p3_conf	p3_dog
439	0.105416	True	Lhasa	0.072832	True
1695	0.049480	True	golden_retriever	0.011934	True
1177	0.334853	True	limousine	0.068173	False
197	0.193539	True	Shih-Tzu	0.039327	True
983	0.028515	True	giant_schnauzer	0.024876	True

```
[102]: # Let us visually assess tweet_likes for quality and tidiness issues.
tweet_likes.head()
```

```
[102]:
```

	id	retweet_count	favorite_count
0	892420643555336193	7872	36940
1	892177421306343426	5844	31785
2	891815181378084864	3857	23948
3	891689557279858688	8040	40260
4	891327558926688256	8702	38459

```
[103]: tweet_likes.sample(5)
```

```
[103]:
```

	id	retweet_count	favorite_count
230	846874817362120707	3950	20273
97	872967104147763200	5096	26203
990	747242308580548608	2950	0
251	842535590457499648	3555	18345
1203	714141408463036416	1421	4375

```
[104]: # let us now also programmatically analyse data for quality issues.  
dog_ratings.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
```

```
[105]: dog_ratings[dog_ratings.tweet_id.duplicated()]
```

```
[105]: Empty DataFrame  
Columns: [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]  
Index: []
```

```
[106]: dog_ratings.tweet_id.value_counts().sample(20)
```

```
[106]: 670823764196741120    1  
780496263422808064    1  
681281657291280384    1  
867051520902168576    1  
690374419777196032    1  
672267570918129665    1  
791821351946420224    1  
840698636975636481    1  
826598799820865537    1  
867072653475098625    1
```

```

671488513339211776    1
670465786746662913    1
835264098648616962    1
672640509974827008    1
671866342182637568    1
738402415918125056    1
675870721063669760    1
887343217045368832    1
752701944171524096    1
820078625395449857    1
Name: tweet_id, dtype: int64

```

```
[107]: image_predictions.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

```

```
[108]: image_predictions.head()
```

```

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

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

```

	p2_conf	p2_dog		p3	p3_conf	p3_dog
0	0.156665	True	Shetland_sheepdog	0.061428	True	
1	0.074192	True	Rhodesian_ridgeback	0.072010	True	
2	0.138584	True	bloodhound	0.116197	True	
3	0.360687	True	miniature_pinscher	0.222752	True	
4	0.243682	True	Doberman	0.154629	True	

```
[109]: image_predictions[image_predictions.tweet_id.duplicated()]
```

```
[109]: Empty DataFrame
Columns: [tweet_id, jpg_url, img_num, p1, p1_conf, p1_dog, p2, p2_conf, p2_dog,
p3, p3_conf, p3_dog]
Index: []
```

```
[110]: tweet_likes.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2333 entries, 0 to 2332
Data columns (total 3 columns):
id                2333 non-null int64
retweet_count     2333 non-null int64
favorite_count    2333 non-null int64
dtypes: int64(3)
memory usage: 54.8 KB
```

```
[111]: tweet_likes[tweet_likes.id.duplicated()]
```

```
[111]: Empty DataFrame
Columns: [id, retweet_count, favorite_count]
Index: []
```

## 2 QUALITY ISSUES

### 2.1 dog\_rating table

1. column 'timestamp' includes '+0000' in the end which is of no use so we can strip that away.
2. 'retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp', are not required so they can be dropped.
3. Erroneous data types for following columns 'tweet\_id', 'timestamp'
4. missing 'expanded\_urls'
5. certain ids are having missing names in the 'name' column.
6. Remove the rows that belong to retweets.
7. Remove elements from name column of the table that do not represent name of a dog.

## 2.2 image\_predictions table

1. dog breed names, certain have capital and certain have small letters, so it is better to make each of them lower case
2. erroneous datatype 'tweet\_id', 'image\_num'

## 2.3 tweet\_likes table

1. erroneous datatype in column 'id'

## 3 TIDINESS ISSUES

1. the 'doggo', 'pupper', 'foofer' and 'puppo' columns can be just a single column named 'dog\_stages'
2. The dog\_ratings, image\_predictions and tweet\_likes represent the same observational unit so they they can all be merged as a single data frame.

```
[112]: dog_ratings.sample()
```

```
[112]:          tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
881  760521673607086080                  NaN                  NaN

          timestamp  \
881  2016-08-02 17:04:31 +0000

          source  \
881  <a href="http://vine.co" rel="nofollow">Vine -...

          text  retweeted_status_id  \
881  Doggo want what doggo cannot have. Temptation ...          NaN

          retweeted_status_user_id  retweeted_status_timestamp  \
881                  NaN                  NaN

          expanded_urls  rating_numerator  rating_denominator  \
881  https://vine.co/v/5ApKetxzmTB          12          10

          name  doggo  floofer  pupper  puppo
881  None  doggo      None      None      None
```

```
[ ]:
```

## 4 CLEANING THE DATA

```
[113]: # In order to clean the data we first of all will create the copy of all the
      ↪ data frames in order to retain the unmodified dataset.
      dog_ratings_clean = dog_ratings.copy()
```

```
image_pred_clean = image_predictions.copy()
tweet_likes_clean = tweet_likes.copy()
```

```
[114]: dog_ratings_clean.sample(5)
```

```
[114]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
606	798340744599797760	NaN	NaN	
2225	668286279830867968	NaN	NaN	
1458	695074328191332352	NaN	NaN	
2196	668852170888998912	NaN	NaN	
611	797165961484890113	7.971238e+17	29166305.0	

	timestamp	\
606	2016-11-15 01:44:00 +0000	
2225	2015-11-22 04:33:59 +0000	
1458	2016-02-04 02:40:08 +0000	
2196	2015-11-23 18:02:38 +0000	
611	2016-11-11 19:55:50 +0000	

	source	\
606	<a href="http://twitter.com/download/iphone" r...	
2225	<a href="http://twitter.com/download/iphone" r...	
1458	<a href="http://twitter.com/download/iphone" r...	
2196	<a href="http://twitter.com/download/iphone" r...	
611	<a href="http://twitter.com/download/iphone" r...	

	text	retweeted_status_id	\
606	RT @dog_rates: This is Davey. He'll have your ...	7.717705e+17	
2225	Meet Rusty. Rusty's dreaming of a world where ...	NaN	
1458	This is Lorenzo. He's educated af. Just gradua...	NaN	
2196	Say hello to Bobb. Bobb is a Golden High Fescu...	NaN	
611	@JODYHiGROLLER it may be an 11/10 but what do...	NaN	

	retweeted_status_user_id	retweeted_status_timestamp	\
606	4.196984e+09	2016-09-02 18:03:10 +0000	
2225	NaN	NaN	
1458	NaN	NaN	
2196	NaN	NaN	
611	NaN	NaN	

	expanded_urls	rating_numerator	\
606	https://twitter.com/dog_rates/status/771770456...	11	
2225	https://twitter.com/dog_rates/status/668286279...	11	
1458	https://twitter.com/dog_rates/status/695074328...	11	
2196	https://twitter.com/dog_rates/status/668852170...	11	
611	NaN	11	

	rating_denominator	name	doggo	floofer	pupper	puppo
606	10	Davey	None	None	None	None
2225	10	Rusty	None	None	None	None
1458	10	Lorenzo	None	None	pupper	None
2196	10	Bobb	None	None	None	None
611	10	None	None	None	None	None

4.1 Note - First of all we will tackle the missing data and then tidiness and quality of data respectively.....

## 5 Missing Data

1. Missing 'expanded\_urls' in dog\_ratings table.
2. Certain ids have missing names in 'name' column in dog\_ratings table.

Since we cannot obtain data for the above issues, we will leave them as it is

[ ]:

```
[115]: # Now let us test is all retweets are removed. For this there should be no non-
      ↪ null values in retweeted_status_id, retweeted_status_user_id,
      ↪ retweeted_status_timestamp.
      dog_ratings_clean.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
```

Therefore our test is complete and we have removed all retweets.



## 6 Tidiness Issues

```
[ ]:
```

## 1. `dog_ratings` table : The 'doggo', 'pupper', 'floofer' and 'puppo' columns can be just a single column named 'dog\_stages'

### 6.0.1 Define

The 'doggo', 'pupper', 'floofer' and 'puppo' columns can be just a single column named 'dog\_stages'. For the purpose we will use `pd.melt` function of pandas

### 6.0.2 Code

```
[116]: dog_ratings_clean.head(1)
```

```
[116]:          tweet_id  in_reply_to_status_id  in_reply_to_user_id \
0  892420643555336193                    NaN                    NaN

          timestamp \
0  2017-08-01 16:23:56 +0000

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

          text  retweeted_status_id \
0  This is Phineas. He's a mystical boy. Only eve...          NaN

          retweeted_status_user_id retweeted_status_timestamp \
0                    NaN                    NaN

          expanded_urls  rating_numerator \
0  https://twitter.com/dog_rates/status/892420643...          13

          rating_denominator  name doggo floofer pupper puppo
0                    10  Phineas  None    None    None  None
```

```
[117]: dog_ratings_clean = pd.melt(dog_ratings_clean, id_vars = ['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'], var_name = 'dog_stages', value_name =
↳ 'stage_name')
```

```
[ ]:
```

### 6.0.3 TEST

```
[118]: dog_ratings_clean.sample(5)
```

```
[118]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
4599	667902449697558528	NaN	NaN	
7378	835309094223372289	NaN	NaN	
2508	862722525377298433	NaN	NaN	
3	891689557279858688	NaN	NaN	
8330	710140971284037632	NaN	NaN	

	timestamp	\
4599	2015-11-21 03:08:47 +0000	
7378	2017-02-25 02:03:02 +0000	
2508	2017-05-11 17:34:13 +0000	
3	2017-07-30 15:58:51 +0000	
8330	2016-03-16 16:29:35 +0000	

	source	\
4599	<a href="http://twitter.com/download/iphone" r...	
7378	<a href="http://twitter.com/download/iphone" r...	
2508	<a href="http://twitter.com/download/iphone" r...	
3	<a href="http://twitter.com/download/iphone" r...	
8330	<a href="http://twitter.com/download/iphone" r...	

	text	retweeted_status_id	\
4599	This is Cleopatra. She is a northern Paperb...	NaN	
7378	RT @dog_rates: So this just changed my life. 1...	7.530398e+17	
2508	This is Dave. He passed the h*ck out. It's bar...	NaN	
3	This is Darla. She commenced a snooze mid meal...	NaN	
8330	This is Tater. His underbite is fierce af. Doe...	NaN	

	retweeted_status_user_id	retweeted_status_timestamp	\
4599	NaN	NaN	
7378	4.196984e+09	2016-07-13 01:34:21 +0000	
2508	NaN	NaN	
3	NaN	NaN	
8330	NaN	NaN	

	expanded_urls	rating_numerator	\
4599	https://twitter.com/dog_rates/status/667902449...	9	
7378	https://vine.co/v/5W2Dg3XPX7a,https://vine.co/...	13	
2508	https://twitter.com/dog_rates/status/862722525...	11	
3	https://twitter.com/dog_rates/status/891689557...	13	
8330	https://twitter.com/dog_rates/status/710140971...	8	

	rating_denominator	name	dog_stages	stage_name
--	--------------------	------	------------	------------

4599	10	Cleopatra	floofer	None
7378	10	None	puppo	None
2508	10	Dave	floofer	None
3	10	Darla	doggo	None
8330	10	Tater	puppo	None

**6.1 2. The dog\_ratings , image\_predictions and tweet\_likes represent the same observational unit so they they can all be merged as a single data frame.**

### 6.1.1 DEFINE

The dog\_ratings , image\_predictions and tweet\_likes represent the same observational unit so they they can all be merged as a single data frame USING pandas pd.merge function.

### 6.1.2 CODE

```
[119]: master_df = pd.merge(dog_ratings_clean, image_pred_clean, on = 'tweet_id')
```

```
[120]: master_df.head()
```

```
[120]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id \
0  892420643555336193                NaN                NaN
1  892420643555336193                NaN                NaN
2  892420643555336193                NaN                NaN
3  892420643555336193                NaN                NaN
4  892177421306343426                NaN                NaN

      timestamp \
0  2017-08-01 16:23:56 +0000
1  2017-08-01 16:23:56 +0000
2  2017-08-01 16:23:56 +0000
3  2017-08-01 16:23:56 +0000
4  2017-08-01 00:17:27 +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 Phineas. He's a mystical boy. Only eve...      NaN
2  This is Phineas. He's a mystical boy. Only eve...      NaN
3  This is Phineas. He's a mystical boy. Only eve...      NaN
4  This is Tilly. She's just checking pup on you...      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	...	img_num	\
0	https://twitter.com/dog_rates/status/892420643...	...	1	
1	https://twitter.com/dog_rates/status/892420643...	...	1	
2	https://twitter.com/dog_rates/status/892420643...	...	1	
3	https://twitter.com/dog_rates/status/892420643...	...	1	
4	https://twitter.com/dog_rates/status/892177421...	...	1	

	p1	p1_conf	p1_dog	p2	p2_conf	p2_dog	p3	p3_conf	\
0	orange	0.097049	False	bagel	0.085851	False	banana	0.076110	
1	orange	0.097049	False	bagel	0.085851	False	banana	0.076110	
2	orange	0.097049	False	bagel	0.085851	False	banana	0.076110	
3	orange	0.097049	False	bagel	0.085851	False	banana	0.076110	
4	Chihuahua	0.323581	True	Pekinese	0.090647	True	papillon	0.068957	

	p3_dog
0	False
1	False
2	False
3	False
4	True

[5 rows x 26 columns]

```
[121]: tweet_likes.head()
```

```
[121]:
```

	id	retweet_count	favorite_count
0	892420643555336193	7872	36940
1	892177421306343426	5844	31785
2	891815181378084864	3857	23948
3	891689557279858688	8040	40260
4	891327558926688256	8702	38459

```
[122]: # We will rename column name 'id' as 'tweet id' so that it can match and be
        ↪merged with other data frames.
        tweet_likes_clean = tweet_likes_clean.rename(columns = {'id' : 'tweet_id'})
        tweet_likes_clean.head()
```

```
[122]:
```

	tweet_id	retweet_count	favorite_count
0	892420643555336193	7872	36940
1	892177421306343426	5844	31785

2	891815181378084864	3857	23948
3	891689557279858688	8040	40260
4	891327558926688256	8702	38459

```
[123]: master_df_comp = pd.merge(master_df, tweet_likes_clean, on= 'tweet_id')
master_df_comp.head()
```

```
[123]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
0  892420643555336193                NaN                NaN
1  892420643555336193                NaN                NaN
2  892420643555336193                NaN                NaN
3  892420643555336193                NaN                NaN
4  892177421306343426                NaN                NaN

      timestamp  \
0  2017-08-01 16:23:56 +0000
1  2017-08-01 16:23:56 +0000
2  2017-08-01 16:23:56 +0000
3  2017-08-01 16:23:56 +0000
4  2017-08-01 00:17:27 +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 Phineas. He's a mystical boy. Only eve...      NaN
2  This is Phineas. He's a mystical boy. Only eve...      NaN
3  This is Phineas. He's a mystical boy. Only eve...      NaN
4  This is Tilly. She's just checking pup on you...      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  ...  \
0  https://twitter.com/dog_rates/status/892420643...  ...
1  https://twitter.com/dog_rates/status/892420643...  ...
2  https://twitter.com/dog_rates/status/892420643...  ...
3  https://twitter.com/dog_rates/status/892420643...  ...
```

```
4 https://twitter.com/dog_rates/status/892177421... ..
```

	p1_conf	p1_dog	p2	p2_conf	p2_dog	p3	p3_conf	p3_dog	\
0	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
1	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
2	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
3	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
4	0.323581	True	Pekinese	0.090647	True	papillon	0.068957	True	

	retweet_count	favorite_count
0	7872	36940
1	7872	36940
2	7872	36940
3	7872	36940
4	5844	31785

```
[5 rows x 28 columns]
```

## 7 Quality Issues

7.1 1. dog\_rating table : Column 'timestamp' includes '+0000' in the end which is of no use so we can strip that away.

### 7.1.1 Define

Column 'timestamp' includes '+0000' in the end which is of no use so we can strip that away using pandas

### 7.1.2 Code

```
[124]: master_df_comp.timestamp = dog_ratings_clean.timestamp.str[:-5]
```

### 7.1.3 Test

```
[125]: master_df_comp.head()
```

```
[125]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
0	892420643555336193	NaN	NaN	
1	892420643555336193	NaN	NaN	
2	892420643555336193	NaN	NaN	
3	892420643555336193	NaN	NaN	
4	892177421306343426	NaN	NaN	

	timestamp	source	\
0	2017-08-01 16:23:56	<a href="http://twitter.com/download/iphone" r...	
1	2017-08-01 00:17:27	<a href="http://twitter.com/download/iphone" r...	
2	2017-07-31 00:18:03	<a href="http://twitter.com/download/iphone" r...	

```

3 2017-07-30 15:58:51 <a href="http://twitter.com/download/iphone" r...
4 2017-07-29 16:00:24 <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 Phineas. He's a mystical boy. Only eve...      NaN
2 This is Phineas. He's a mystical boy. Only eve...      NaN
3 This is Phineas. He's a mystical boy. Only eve...      NaN
4 This is Tilly. She's just checking pup on you...      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  ...  \
0 https://twitter.com/dog_rates/status/892420643...  ...
1 https://twitter.com/dog_rates/status/892420643...  ...
2 https://twitter.com/dog_rates/status/892420643...  ...
3 https://twitter.com/dog_rates/status/892420643...  ...
4 https://twitter.com/dog_rates/status/892177421...  ...

p1_conf  p1_dog      p2  p2_conf  p2_dog      p3  p3_conf  p3_dog  \
0 0.097049  False    bagel 0.085851  False    banana 0.076110  False
1 0.097049  False    bagel 0.085851  False    banana 0.076110  False
2 0.097049  False    bagel 0.085851  False    banana 0.076110  False
3 0.097049  False    bagel 0.085851  False    banana 0.076110  False
4 0.323581  True     Pekinese 0.090647  True     papillon 0.068957  True

retweet_count  favorite_count
0             7872             36940
1             7872             36940
2             7872             36940
3             7872             36940
4             5844             31785

```

[5 rows x 28 columns]

[ ]:

## 7.2 2. dog\_rating table : Remove the rows that belong to retweets.

### 7.2.1 Define

```
[126]: # So in order to remove the retweets, we have to remove the rows having any
↳ entries in the 'retweeted_status_id', 'retweeted_status_user_id',
↳ 'retweeted_status_timestamp' columns.
# Following is the code for that.
master_df_comp.drop(master_df_comp[master_df_comp['retweeted_status_id'].
↳ notnull()== True].index, inplace = True)
master_df_comp.drop(master_df_comp[master_df_comp['retweeted_status_user_id'].
↳ notnull()== True].index, inplace = True)
master_df_comp.drop(master_df_comp[master_df_comp['retweeted_status_timestamp'].
↳ notnull()== True].index, inplace = True)
master_df_comp.head()
```

```
[126]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
0  892420643555336193                NaN                NaN
1  892420643555336193                NaN                NaN
2  892420643555336193                NaN                NaN
3  892420643555336193                NaN                NaN
4  892177421306343426                NaN                NaN

      timestamp                                     source  \
0  2017-08-01 16:23:56  <a href="http://twitter.com/download/iphone" r...
1  2017-08-01 00:17:27  <a href="http://twitter.com/download/iphone" r...
2  2017-07-31 00:18:03  <a href="http://twitter.com/download/iphone" r...
3  2017-07-30 15:58:51  <a href="http://twitter.com/download/iphone" r...
4  2017-07-29 16:00:24  <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 Phineas. He's a mystical boy. Only eve...        NaN
2  This is Phineas. He's a mystical boy. Only eve...        NaN
3  This is Phineas. He's a mystical boy. Only eve...        NaN
4  This is Tilly. She's just checking pup on you...        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  ...  \
0  https://twitter.com/dog_rates/status/892420643...  ...
1  https://twitter.com/dog_rates/status/892420643...  ...
2  https://twitter.com/dog_rates/status/892420643...  ...
```



```
3 https://twitter.com/dog_rates/status/892420643...
4 https://twitter.com/dog_rates/status/892177421...
```

	p1_conf	p1_dog	p2	p2_conf	p2_dog	p3	p3_conf	p3_dog	\
0	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
1	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
2	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
3	0.097049	False	bagel	0.085851	False	banana	0.076110	False	
4	0.323581	True	Pekinese	0.090647	True	papillon	0.068957	True	

	retweet_count	favorite_count
0	7872	36940
1	7872	36940
2	7872	36940
3	7872	36940
4	5844	31785

[5 rows x 28 columns]

### 7.3 3. Erroneous data types for following columns 'tweet\_id', 'timestamp' and 'image\_num'.

#### 7.3.1 DEFINE

Erroneous data types for following columns 'tweet\_id', 'timestamp' and 'image\_num'.

#### 7.3.2 CODE

```
[127]: master_df_comp.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 7948 entries, 0 to 8243
Data columns (total 28 columns):
tweet_id                7948 non-null int64
in_reply_to_status_id   92 non-null float64
in_reply_to_user_id     92 non-null float64
timestamp               7948 non-null object
source                  7948 non-null object
text                    7948 non-null object
retweeted_status_id     0 non-null float64
retweeted_status_user_id 0 non-null float64
retweeted_status_timestamp 0 non-null object
expanded_urls           7948 non-null object
rating_numerator        7948 non-null int64
rating_denominator      7948 non-null int64
name                    7948 non-null object
dog_stages              7948 non-null object
stage_name              7948 non-null object
```

```

jpg_url          7948 non-null object
img_num          7948 non-null int64
p1               7948 non-null object
p1_conf          7948 non-null float64
p1_dog           7948 non-null bool
p2               7948 non-null object
p2_conf          7948 non-null float64
p2_dog           7948 non-null bool
p3               7948 non-null object
p3_conf          7948 non-null float64
p3_dog           7948 non-null bool
retweet_count    7948 non-null int64
favorite_count   7948 non-null int64
dtypes: bool(3), float64(7), int64(6), object(12)
memory usage: 1.6+ MB

```

Here we see that 'tweet\_id' and 'img\_num' can be of object datatype as they wouldn't require any calculation and 'timestamp' must be a datetime datatype.

```
[128]: master_df_comp['timestamp'] = pd.to_datetime(master_df_comp['timestamp'])
```

```
[129]: master_df_comp.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 7948 entries, 0 to 8243
Data columns (total 28 columns):
tweet_id          7948 non-null int64
in_reply_to_status_id    92 non-null float64
in_reply_to_user_id      92 non-null float64
timestamp          7948 non-null datetime64[ns]
source             7948 non-null object
text               7948 non-null object
retweeted_status_id      0 non-null float64
retweeted_status_user_id  0 non-null float64
retweeted_status_timestamp  0 non-null object
expanded_urls        7948 non-null object
rating_numerator      7948 non-null int64
rating_denominator     7948 non-null int64
name                7948 non-null object
dog_stages           7948 non-null object
stage_name           7948 non-null object
jpg_url              7948 non-null object
img_num              7948 non-null int64
p1                   7948 non-null object
p1_conf              7948 non-null float64
p1_dog               7948 non-null bool
p2                   7948 non-null object
p2_conf              7948 non-null float64

```

```

p2_dog                7948 non-null bool
p3                    7948 non-null object
p3_conf               7948 non-null float64
p3_dog                7948 non-null bool
retweet_count         7948 non-null int64
favorite_count        7948 non-null int64
dtypes: bool(3), datetime64[ns](1), float64(7), int64(6), object(11)
memory usage: 1.6+ MB

```

```
[130]: master_df_comp['img_num'] = master_df_comp['img_num'].astype(object)
```

```
[131]: master_df_comp['tweet_id'] = master_df_comp['tweet_id'].astype(object)
```

```
[132]: master_df_comp.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 7948 entries, 0 to 8243
Data columns (total 28 columns):
tweet_id                7948 non-null object
in_reply_to_status_id   92 non-null float64
in_reply_to_user_id     92 non-null float64
timestamp               7948 non-null datetime64[ns]
source                  7948 non-null object
text                    7948 non-null object
retweeted_status_id     0 non-null float64
retweeted_status_user_id 0 non-null float64
retweeted_status_timestamp 0 non-null object
expanded_urls           7948 non-null object
rating_numerator        7948 non-null int64
rating_denominator      7948 non-null int64
name                    7948 non-null object
dog_stages              7948 non-null object
stage_name              7948 non-null object
jpg_url                 7948 non-null object
img_num                 7948 non-null object
p1                      7948 non-null object
p1_conf                 7948 non-null float64
p1_dog                  7948 non-null bool
p2                      7948 non-null object
p2_conf                 7948 non-null float64
p2_dog                  7948 non-null bool
p3                      7948 non-null object
p3_conf                 7948 non-null float64
p3_dog                  7948 non-null bool
retweet_count           7948 non-null int64
favorite_count          7948 non-null int64
dtypes: bool(3), datetime64[ns](1), float64(7), int64(4), object(13)
memory usage: 1.6+ MB

```

### 7.3.3 TEST

```
[133]: master_df_comp.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 7948 entries, 0 to 8243
Data columns (total 28 columns):
tweet_id                7948 non-null object
in_reply_to_status_id   92 non-null float64
in_reply_to_user_id     92 non-null float64
timestamp               7948 non-null datetime64[ns]
source                  7948 non-null object
text                    7948 non-null object
retweeted_status_id      0 non-null float64
retweeted_status_user_id 0 non-null float64
retweeted_status_timestamp 0 non-null object
expanded_urls           7948 non-null object
rating_numerator        7948 non-null int64
rating_denominator      7948 non-null int64
name                    7948 non-null object
dog_stages              7948 non-null object
stage_name              7948 non-null object
jpg_url                 7948 non-null object
img_num                 7948 non-null object
p1                      7948 non-null object
p1_conf                 7948 non-null float64
p1_dog                  7948 non-null bool
p2                      7948 non-null object
p2_conf                 7948 non-null float64
p2_dog                  7948 non-null bool
p3                      7948 non-null object
p3_conf                 7948 non-null float64
p3_dog                  7948 non-null bool
retweet_count           7948 non-null int64
favorite_count          7948 non-null int64
dtypes: bool(3), datetime64[ns](1), float64(7), int64(4), object(13)
memory usage: 1.6+ MB
```

7.4 4. 'retweeted\_status\_id', 'retweeted\_status\_user\_id',  
'retweeted\_status\_timestamp', are not required so they can be dropped.

#### 7.4.1 DEFINE

'retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp', are not required so they can be dropped since the retweets have now been removed.

## 7.4.2 CODE

```
[134]: master_df_comp.drop(columns= ['retweeted_status_user_id',  
↳ 'retweeted_status_id', 'retweeted_status_timestamp'], inplace = True)
```

**7.5 5. dog breed names, certain have capital and certain have small letters, so it is better to make each of them lower case**

### 7.5.1 DEFINE

dog breed names, certain have capital and certain have small letters, so it is better to make each of them lower case in 'p1', 'p2', 'p3' columns.

### 7.5.2 CODE

```
[135]: master_df_comp.head(1)
```

```
[135]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \  
0  892420643555336193                NaN                NaN  \  
      timestamp                                     source  \  
0  2017-08-01 16:23:56  <a href="http://twitter.com/download/iphone" r...  \  
      text  \  
0  This is Phineas. He's a mystical boy. Only eve...  \  
      expanded_urls  rating_numerator  \  
0  https://twitter.com/dog_rates/status/892420643...      13  \  
      rating_denominator  name  ...  p1_conf  p1_dog  p2  \  
0      10  Phineas  ...  0.097049  False  bagel  \  
      p2_conf  p2_dog  p3  p3_conf  p3_dog  retweet_count  favorite_count  \  
0  0.085851  False  banana  0.07611  False      7872      36940  \  
[1 rows x 25 columns]
```

```
[136]: master_df_comp['p1'] = master_df_comp['p1'].str.lower()
```

```
[137]: master_df_comp['p2'] = master_df_comp['p2'].str.lower()
```

```
[138]: master_df_comp['p3'] = master_df_comp['p3'].str.lower()
```

### 7.5.3 TEST

```
[139]: master_df_comp.sample(5)
```

```

[139]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
3535  737826014890496000      NaN      NaN
3738  727644517743104000      NaN      NaN
4256  708356463048204288      NaN      NaN
7566  668989615043424256      NaN      NaN
7324  670403879788544000      NaN      NaN

      timestamp      source \
3535  2016-04-11 03:33:34 <a href="http://twitter.com/download/iphone" r...
3738  2016-02-20 02:06:50 <a href="http://twitter.com/download/iphone" r...
4256  2015-12-09 18:59:46 <a href="http://twitter.com/download/iphone" r...
7566  2016-12-25 21:12:41 <a href="http://twitter.com/download/iphone" r...
7324  2017-03-21 00:22:10 <a href="http://twitter.com/download/iphone" r...

      text \
3535  This is Remy. He has some long ass ears (proba...
3738  Here's a doggo struggling to cope with the win...
4256  This is Oliver. That is his castle. He protect...
7566  This is Bernie. He's taking his Halloween cost...
7324  This is Nigel. He accidentally popped his ball...

      expanded_urls  rating_numerator \
3535  https://twitter.com/dog_rates/status/737826014...      10
3738  https://twitter.com/dog_rates/status/727644517...      13
4256  https://twitter.com/dog_rates/status/708356463...      10
7566  https://twitter.com/dog_rates/status/668989615...      3
7324  https://twitter.com/dog_rates/status/670403879...      10

      rating_denominator  name  ...  p1_conf  p1_dog \
3535      10      Remy      ...      0.990391      True
3738      10      None      ...      0.457164      True
4256      10      Oliver      ...      0.871283      True
7566      10      Bernie      ...      0.917326      True
7324      10      Nigel      ...      0.802223      True

      p2  p2_conf  p2_dog      p3 \
3535  rhodesian_ridgeback  0.005605      True  chesapeake_bay_retriever
3738      kuvasz  0.391710      True      labrador_retriever
4256  french_bulldog  0.041820      True      bath_towel
7566      waffle_iron  0.014918      False      chihuahua
7324  french_bulldog  0.172557      True      bull_mastiff

      p3_conf  p3_dog  retweet_count  favorite_count
3535  0.002869      True      1797      5366
3738  0.094523      True      1768      5982
4256  0.015228      False      1335      3646
7566  0.013524      True      323      668

```

```
7324  0.007163  True          151          423
```

```
[5 rows x 25 columns]
```

```
[ ]:
```

## 7.6 6.Remove elements from name column of the table that do not represent name of a dog.

### 7.6.1 DEFINE

Remove elements from name column of the table that do not represent name of a dog

### 7.6.2 CODE

```
[140]: master_df_comp['name'] = master_df_comp['name'].replace( to_replace = ['a', 'u',  
→ 'an' , 'the', 'by', 'very'], value = 'None')
```

```
[141]: master_df_comp['name'].sample(25)
```

```
[141]: 613      Marlee  
7935      None  
5568      None  
1065      Daisy  
743       Cannon  
4135      Milo  
5515      Jiminy  
445       Coco  
5326      Olivia  
5749      Brody  
2750      Belle  
6177      Duke  
2479      None  
7964      None  
259       Shadow  
5407      Petrick  
1259      Cash  
5716      Ozzie  
4385      Kara  
8178      None  
6058      Derek  
1657      Kyro  
4537      Rambo  
1089      Tucker  
943       Lucy  
Name: name, dtype: object
```

### 7.6.3 TEST

```
[142]: master_df_comp['name']
```

```
[142]: 0      Phineas
      1      Phineas
      2      Phineas
      3      Phineas
      4      Tilly
      5      Tilly
      6      Tilly
      7      Tilly
      8      Archie
      9      Archie
     10      Archie
     11      Archie
     12      Darla
     13      Darla
     14      Darla
     15      Darla
     16      Franklin
     17      Franklin
     18      Franklin
     19      Franklin
     20      None
     21      None
     22      None
     23      None
     24      Jax
     25      Jax
     26      Jax
     27      Jax
     28      None
     29      None
      ...
    8214      None
    8215      None
    8216      None
    8217      None
    8218      None
    8219      None
    8220      None
    8221      None
    8222      None
    8223      None
    8224      None
    8225      None
```



```

8226      None
8227      None
8228      None
8229      None
8230      None
8231      None
8232      None
8233      None
8234      None
8235      None
8236      None
8237      None
8238      None
8239      None
8240      None
8241      None
8242      None
8243      None
Name: name, Length: 7948, dtype: object

```

```

[150]: # Let us now store our cleaned dataframe in a csv file
master_df_comp.to_csv('twitter_archive_master.csv')

```

## 7.7 OUR DATASET IS NOW CLEANED. LET US NOW TURN TOWARDS VISUALISATION AND INSIGHTS

## 8 VISUALISATION

```

[143]: master_df_comp.head()

```

```

[143]:      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
0  892420643555336193                NaN                NaN
1  892420643555336193                NaN                NaN
2  892420643555336193                NaN                NaN
3  892420643555336193                NaN                NaN
4  892177421306343426                NaN                NaN

      timestamp                                     source  \
0  2017-08-01 16:23:56  <a href="http://twitter.com/download/iphone" r...
1  2017-08-01 00:17:27  <a href="http://twitter.com/download/iphone" r...
2  2017-07-31 00:18:03  <a href="http://twitter.com/download/iphone" r...
3  2017-07-30 15:58:51  <a href="http://twitter.com/download/iphone" r...
4  2017-07-29 16:00:24  <a href="http://twitter.com/download/iphone" r...

      text  \
0  This is Phineas. He's a mystical boy. Only eve...
1  This is Phineas. He's a mystical boy. Only eve...

```

```

2 This is Phineas. He's a mystical boy. Only eve...
3 This is Phineas. He's a mystical boy. Only eve...
4 This is Tilly. She's just checking pup on you...

```

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

	rating_denominator	name	...	p1_conf	p1_dog	p2	\
0	10	Phineas	...	0.097049	False	bagel	
1	10	Phineas	...	0.097049	False	bagel	
2	10	Phineas	...	0.097049	False	bagel	
3	10	Phineas	...	0.097049	False	bagel	
4	10	Tilly	...	0.323581	True	pekinese	

	p2_conf	p2_dog	p3	p3_conf	p3_dog	retweet_count	favorite_count
0	0.085851	False	banana	0.076110	False	7872	36940
1	0.085851	False	banana	0.076110	False	7872	36940
2	0.085851	False	banana	0.076110	False	7872	36940
3	0.085851	False	banana	0.076110	False	7872	36940
4	0.090647	True	papillon	0.068957	True	5844	31785

[5 rows x 25 columns]

```
[144]: master_df_comp.info()
```

```

<class 'pandas.core.frame.DataFrame'>
Int64Index: 7948 entries, 0 to 8243
Data columns (total 25 columns):
tweet_id          7948 non-null object
in_reply_to_status_id  92 non-null float64
in_reply_to_user_id  92 non-null float64
timestamp         7948 non-null datetime64[ns]
source            7948 non-null object
text              7948 non-null object
expanded_urls      7948 non-null object
rating_numerator    7948 non-null int64
rating_denominator  7948 non-null int64
name              7948 non-null object
dog_stages         7948 non-null object
stage_name         7948 non-null object
jpg_url            7948 non-null object
img_num            7948 non-null object
p1                 7948 non-null object

```

```

p1_conf          7948 non-null float64
p1_dog           7948 non-null bool
p2              7948 non-null object
p2_conf          7948 non-null float64
p2_dog           7948 non-null bool
p3              7948 non-null object
p3_conf          7948 non-null float64
p3_dog           7948 non-null bool
retweet_count    7948 non-null int64
favorite_count   7948 non-null int64
dtypes: bool(3), datetime64[ns](1), float64(5), int64(4), object(12)
memory usage: 1.4+ MB

```

```

[145]: stage_max = master_df_comp['stage_name'].value_counts()
       stage_max_df = pd.DataFrame(stage_max)
       stage_max_df

```

```

[145]:      stage_name
None      7632
pupper     212
doggo       73
puppo       23
floofer      8

```

```

[146]: breed_max = master_df_comp['p1'].value_counts().head()
       breed_max_df = pd.DataFrame(breed_max)
       breed_max_df

```

```

[146]:      p1
golden_retriever  556
labrador_retriever 372
pembroke          352
chihuahua         316
pug               216

```

```

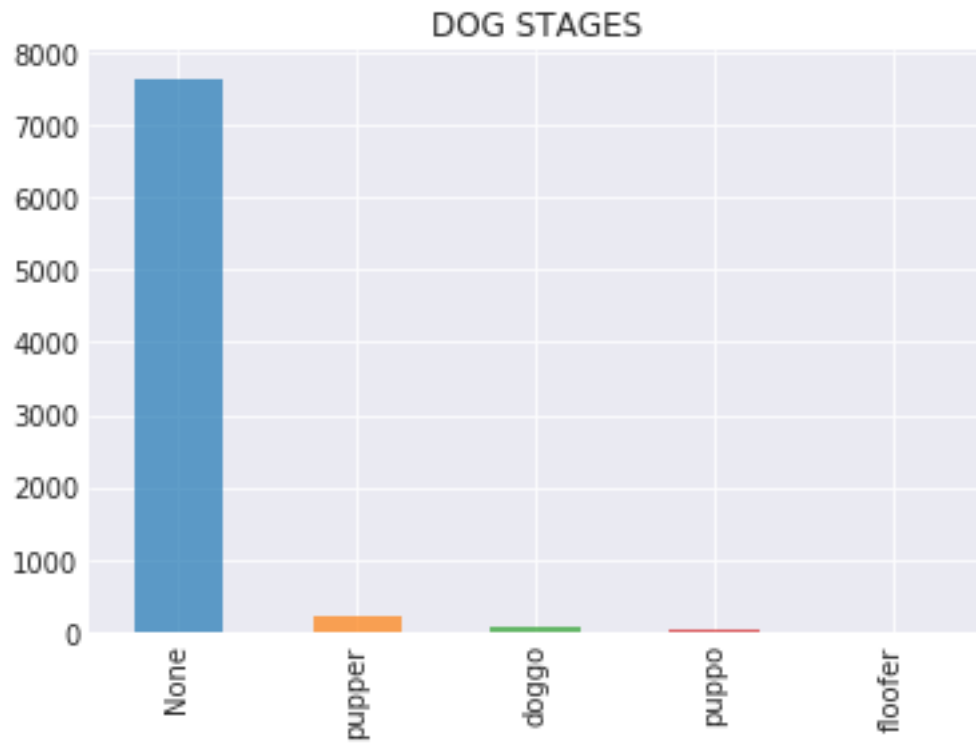
[147]: % matplotlib inline
import seaborn as sns
sns.set_style('darkgrid')
stage_max_df.plot.bar( y='stage_name', alpha = 0.7, title = 'DOG STAGES',
↳ legend = '')

```

```

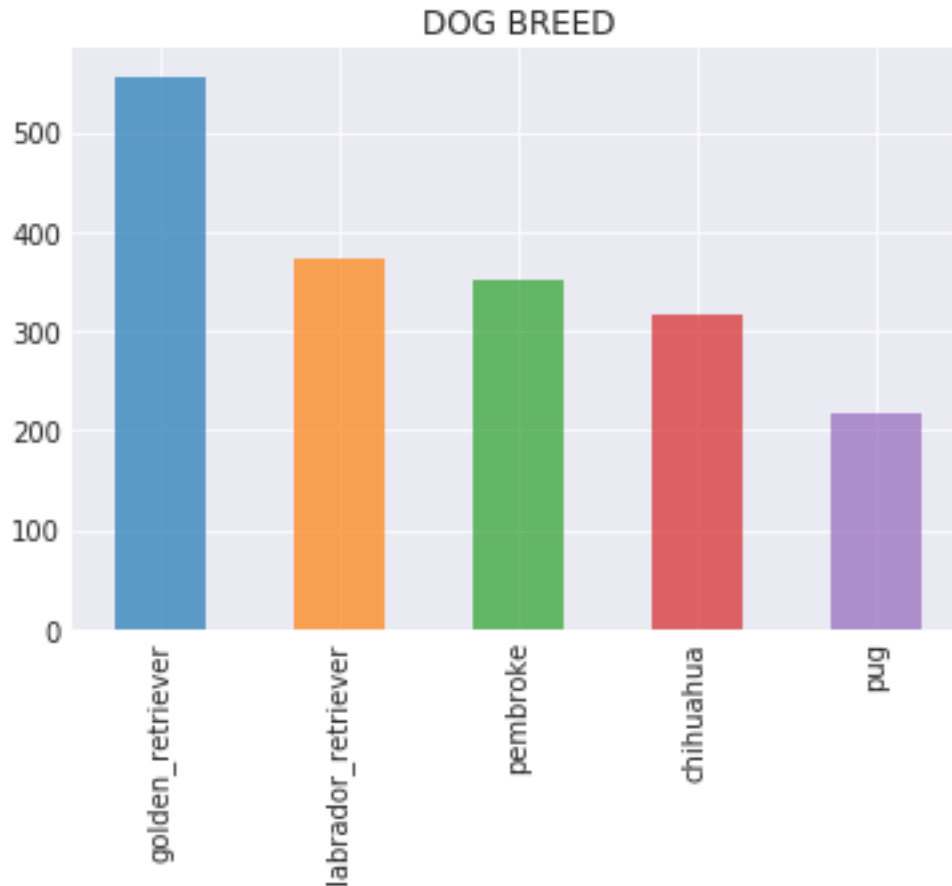
[147]: <matplotlib.axes._subplots.AxesSubplot at 0x7ff946fefc50>

```



```
[148]: breed_max_df.plot.bar(y = 'p1', alpha= 0.7, legend = '', title = 'DOG BREED')
```

```
[148]: <matplotlib.axes._subplots.AxesSubplot at 0x7ff947027198>
```



## 8.1 INSIGHTS

1. As we see from the above **visualisation no.1** that data wrangling specially for dog stages made it so convenient to see that most of the dogs could not be identified with a stage while maximum of the dogs whose stages could be defined lied in the pupper stage.
2. From the **second visualisation** we get that by **combining image\_prediction table data together** made it easy to identify first prediction(p1) of the dog breed that came out to be golden retriever followed by labrador retriever and pembroke.
3. We see that by **removing the retweets** we are able to get a true picture of the data analysed as with retweets the counts would have been biased. we have also removed certain unrequired columns['retweeted\_status\_id', 'retweeted\_status\_user\_id', 'retweeted\_status\_timestamp'] that contained retweet information.
4. We have also **altered the timestamp** to make it more presentable and also **changed the datatpoe od certain columns** ['tweet\_id', 'timestamp' and 'image\_num'] which would make the work of data analysts who further utilise the dataset easier.

I believe that above wrangling and insights are in accordance with the project motivation and have formed a clean dataset.