

# wrangle\_act

August 10, 2021

## 1 Project: Wrangle and Analyze WeRateDogs Twitter data

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## Introduction

In this project, the tweet archive of Twitter user [[@dog\\_rates](https://twitter.com/dog_rates)]([https://twitter.com/dog\\_rates](https://twitter.com/dog_rates)), also known as [WeRateDogs](#) dataset will be wrangled. WeRateDogs is a Twitter account that rates people's dogs with a humorous comment about the dog. These ratings almost always have a denominator of 10. The numerators, though? Almost always greater than 10. 11/10, 12/10, 13/10, etc. Why? Because "[they're good dogs Brent](#)". WeRateDogs has over 9 million followers and has received international media coverage and popular posts are re-posted on Instagram and Facebook. Our goal is, wrangle WeRateDogs Twitter data to create interesting and "Wow!"-worthy analyses and visualizations.

**Questions:**

Most tweeted dog breeds

Most tweeted dog stages

Most tweeted dog names

Relationship between retweet and favorite counts

Does Ratings associated with retweet and favorite counts?

Which Dog breeds are popular(retweet,favorite) and received highest ratings?

Which Dog stages are popular(retweet,favorite) and received highest ratings?

```
In [1]: # Import required packages
import pandas as pd
import numpy as np
import os
import requests
```

```

import tweepy
from tweepy import OAuthHandler
import json
from timeit import default_timer as timer
import re
import matplotlib.pyplot as plt
import seaborn as sns

# Magic word to visualize plots in the notebook
%matplotlib inline

```

## ## Data Wrangling

The Data Wrangling process contains below steps - Data Gathering - Data Assessing - Data Cleaning

### ### Data Gathering

**Enhanced Twitter Archive** Download `twitter_archive_enhanced.csv` from [Twitter archive](#) provided by Udacity which contains basic tweet data (tweet ID, timestamp, text, etc.)

```

In [2]: # Create data folder to store all data files
        if not os.path.exists('data'):
            os.makedirs('data')

In [3]: # Get response from Twitter archive data url using requests library
        archive_url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/59a4e958_twitter-
        response = requests.get(archive_url)

        # Write Twitter archive data response into csv file
        with open('data/twitter-archive-enhanced.csv', 'wb') as file:
            file.write(response.content)

        # Read data from csv file and Load it into dataframe
        archive = pd.read_csv('data/twitter-archive-enhanced.csv')

```

**Image Predictions File** Download `image_predictions.tsv` from [image-predictions](#) provided by Udacity which contains table full of image predictions (the top three only) alongside each tweet ID, image URL, and the image number that corresponded to the most confident prediction

```

In [4]: # Get response from image-predictions url using requests library
        img_pred_url = 'https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-
        response = requests.get(img_pred_url)

        # Write image-predictions response into tsv file
        with open('data/image-predictions.tsv', 'wb') as file:
            file.write(response.content)

        # Read data from tsv file and Load it into dataframe
        img_pred = pd.read_csv('data/image-predictions.tsv', sep = '\t')

```

**Additional Data via the Twitter API** We will be using Tweepy to query Twitter's API for additional data beyond the data included in the WeRateDogs Twitter archive. This additional data will include retweet count and favorite count.

**Note:** As per the standard practice for APIs and public code secret keys are hidden to comply with Twitter's API terms and conditions

```
In [5]: # 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 = '8MX5HZWGEWgrRtOvUN1Fesk0a'
consumer_secret = 'rhESwQh9x4a09YVl8CRnoV05l07jP6HUds6Ty0GH5kTFVLtnS4'
access_token = '3147900582-zT3c5CEeWfFTDjRmmvCnKbyZfmRoPAqSAo5VxEg'
access_secret = 'P3Vx0QSX6SfsZgXlNkLysExDpN8FCxx9MEGF0CLcfE5Gp'

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

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

tweet_ids = archive.tweet_id.values
len(tweet_ids)

# Query Twitter's API for JSON data for each tweet ID in the Twitter archive
count = 0
fails_dict = {}
start = timer()
tweet_api = []

# Save each tweet's returned JSON as a new line in a .txt file
with open('data/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_ids:
        count += 1
        print(str(count) + ": " + str(tweet_id))
        try:
            tweet = api.get_status(tweet_id, tweet_mode='extended')
            tweet_api.append({
                'tweet_id': tweet_id,
                'favorite_count': tweet._json['favorite_count'],
                'retweet_count': tweet._json['retweet_count']})
            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 the difference in start and end timers
print(end - start)

# Print failed Tweet IDs
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
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14: 889638837579907072
Success
15: 889531135344209921
Success
16: 889278841981685760
Success
17: 888917238123831296
Success
18: 888804989199671297
Success
19: 888554962724278272
Success
20: 888202515573088257
Fail
21: 888078434458587136
Success
```

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24: 887473957103951883  
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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
2061.76528787
{888202515573088257: TweepError([{'code': 144, 'message': 'No status found with that ID.'}]), 87

```

- Consider only the responses which are success

```

In [6]: # Store twitter API response content to dataframe for further analysis
tweet_api = pd.DataFrame(tweet_api)
tweet_api.to_csv('data/tweet_api_json.csv', encoding='utf-8', index=False)

```

```

In [7]: # Load data from the json csv
tweet_api = pd.read_csv('data/tweet_api_json.csv')

```

## ASSESS

**Visual Assessment** Each piece of gathered data assessed manually to identify **Quality** and **Tidiness issues** using Jupyter Notebook and other external applications like excel

```

In [8]: # Twitter Archive Data
archive

```

```

Out[8]:
      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
...	...	...	...
2351	666049248165822465	NaN	NaN
2352	666044226329800704	NaN	NaN
2353	666033412701032449	NaN	NaN
2354	666029285002620928	NaN	NaN
2355	666020888022790149	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
...	...
2351	2015-11-16 00:24:50 +0000
2352	2015-11-16 00:04:52 +0000
2353	2015-11-15 23:21:54 +0000
2354	2015-11-15 23:05:30 +0000
2355	2015-11-15 22:32:08 +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...
...	...
2351	<a href="http://twitter.com/download/iphone" r...
2352	<a href="http://twitter.com/download/iphone" r...
2353	<a href="http://twitter.com/download/iphone" r...
2354	<a href="http://twitter.com/download/iphone" r...
2355	<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
...	...	...
2351	Here we have a 1949 1st generation vulpix. Enj...	NaN
2352	This is a purebred Piers Morgan. Loves to Netf...	NaN
2353	Here is a very happy pup. Big fan of well-main...	NaN
2354	This is a western brown Mitsubishi terrier. Up...	NaN
2355	Here we have a Japanese Irish Setter. Lost eye...	NaN

	retweeted_status_user_id	retweeted_status_timestamp	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	
3	NaN	NaN	
4	NaN	NaN	
...	...	...	
2351	NaN	NaN	
2352	NaN	NaN	
2353	NaN	NaN	
2354	NaN	NaN	
2355	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	
...	...	...	
2351	https://twitter.com/dog_rates/status/666049248...	5	
2352	https://twitter.com/dog_rates/status/666044226...	6	
2353	https://twitter.com/dog_rates/status/666033412...	9	
2354	https://twitter.com/dog_rates/status/666029285...	7	
2355	https://twitter.com/dog_rates/status/666020888...	8	

	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
...	...	...	...	...	...	...
2351	10	None	None	None	None	None
2352	10	a	None	None	None	None
2353	10	a	None	None	None	None
2354	10	a	None	None	None	None
2355	10	None	None	None	None	None

[2356 rows x 17 columns]

- Null values in multiple columns
- Reply and Retweet columns are present. **We only want original ratings (no retweets) that have images**
- Rating numerator and denominator has strange values
- Individual columns for dog stages
- *&amp;mp* ; present instead of & symbol in tweet text



- Url present in both tweet text and expanded\_urls which are same.

In [9]: # Image Predictions Data

img\_pred

```
Out[9]:
```

	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
...	...	...
2070	891327558926688256	https://pbs.twimg.com/media/DF6hr6BUMAAzZgT.jpg
2071	891689557279858688	https://pbs.twimg.com/media/DF_q7IAWsAEuuN8.jpg
2072	891815181378084864	https://pbs.twimg.com/media/DGBdLU1WsAANxJ9.jpg
2073	892177421306343426	https://pbs.twimg.com/media/DGGmoV4XsAAUL6n.jpg
2074	892420643555336193	https://pbs.twimg.com/media/DGKD1-bXoAAIAUK.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
...	...	...	...	...	...
2070	2	basset	0.555712	True	English_springer
2071	1	paper_towel	0.170278	False	Labrador_retriever
2072	1	Chihuahua	0.716012	True	malamute
2073	1	Chihuahua	0.323581	True	Pekinese
2074	1	orange	0.097049	False	bagel

  

	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
...	...	...	...	...	...
2070	0.225770	True	German_short-haired_pointer	0.175219	True
2071	0.168086	True	spatula	0.040836	False
2072	0.078253	True	kelpie	0.031379	True
2073	0.090647	True	papillon	0.068957	True
2074	0.085851	False	banana	0.076110	False

[2075 rows x 12 columns]

- Contains three set of image predictions including **False** predictions
- Predicted dog names contains difference kinds of casing. E.g: German\_shepherd, redbone

- Also, contains underscore and hyphen characters in names

```
In [10]: # Twitter API Data
        tweet_api
```

```
Out[10]:
```

	tweet_id	favorite_count	retweet_count
0	892420643555336193	34559	7199
1	892177421306343426	29964	5407
2	891815181378084864	22540	3572
3	891689557279858688	37788	7416
4	891327558926688256	36089	7963
...	...	...	...
2323	666049248165822465	92	37
2324	666044226329800704	252	118
2325	666033412701032449	103	37
2326	666029285002620928	116	40
2327	666020888022790149	2325	436

```
[2328 rows x 3 columns]
```

## Programmatic Assessment Assessing data using pandas functions and methods

### Archive

```
In [11]: # Brief summary of DataFrame to check missing or possibly errant data
        archive.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2356 entries, 0 to 2355
Data columns (total 17 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   tweet_id                             2356 non-null   int64
1   in_reply_to_status_id                78 non-null     float64
2   in_reply_to_user_id                  78 non-null     float64
3   timestamp                            2356 non-null   object
4   source                               2356 non-null   object
5   text                                 2356 non-null   object
6   retweeted_status_id                 181 non-null     float64
7   retweeted_status_user_id            181 non-null     float64
8   retweeted_status_timestamp           181 non-null     object
9   expanded_urls                       2297 non-null   object
10  rating_numerator                     2356 non-null   int64
11  rating_denominator                   2356 non-null   int64
12  name                                 2356 non-null   object
13  doggo                               2356 non-null   object
14  floofer                             2356 non-null   object
15  pupper                              2356 non-null   object
```

```
16 puppo 2356 non-null object
dtypes: float64(4), int64(3), object(10)
memory usage: 313.0+ KB
```

- Erroneous datatypes:
- `tweet_id` *int64* instead of *string*
- `timestamp` *object* instead of *datetime*

```
In [12]: # Check for duplicate instances
archive.duplicated().sum()
```

```
Out[12]: 0
```

```
In [13]: # Check for missing values in Dataset
archive.isna().sum()
```

```
Out[13]: tweet_id 0
in_reply_to_status_id 2278
in_reply_to_user_id 2278
timestamp 0
source 0
text 0
retweeted_status_id 2175
retweeted_status_user_id 2175
retweeted_status_timestamp 2175
expanded_urls 59
rating_numerator 0
rating_denominator 0
name 0
doggo 0
floofer 0
pupper 0
puppo 0
dtype: int64
```

- Retweet and Reply columns are having more number of null values which are not necessary

```
In [14]: # Check number of unique elements
archive.nunique()
```

```
Out[14]: tweet_id 2356
in_reply_to_status_id 77
in_reply_to_user_id 31
timestamp 2356
source 4
text 2356
retweeted_status_id 181
```

```

retweeted_status_user_id      25
retweeted_status_timestamp    181
expanded_urls                 2218
rating_numerator              40
rating_denominator            18
name                          957
doggo                         2
floofer                       2
pupper                        2
puppo                         2
dtype: int64

```

```
In [15]: # Check reply_to_status_id unique value counts of null and non null values
archive.in_reply_to_status_id.notna().value_counts()
```

```
Out[15]: False      2278
         True        78
         Name: in_reply_to_status_id, dtype: int64
```

```
In [16]: # Check retweeted_status_id unique value counts of null and non null values
archive.retweeted_status_id.notna().value_counts()
```

```
Out[16]: False      2175
         True        181
         Name: retweeted_status_id, dtype: int64
```

- From the data retrived from twitter api, **2175** columns are having original ratings that have images

```
In [17]: # Check source unique values and counts
archive.source.value_counts()
```

```
Out[17]: <a href="http://twitter.com/download/iphone" rel="nofollow">Twitter for iPhone</a>
<a href="http://vine.co" rel="nofollow">Vine - Make a Scene</a>
<a href="http://twitter.com" rel="nofollow">Twitter Web Client</a>
<a href="https://about.twitter.com/products/tweetdeck" rel="nofollow">TweetDeck</a>
         Name: source, dtype: int64
```

- Source not extracted properly from hyperlink tag

```
In [18]: # Check expanded_url unique value counts of null and non null values
archive.expanded_urls.isna().value_counts()
```

```
Out[18]: False      2297
         True        59
         Name: expanded_urls, dtype: int64
```

```
In [19]: # Concise summary statistics of numerical columns in DataFrame
archive[['rating_numerator', 'rating_denominator']].describe()
```

```
Out[19]:
```

	rating_numerator	rating_denominator
count	2356.000000	2356.000000
mean	13.126486	10.455433
std	45.876648	6.745237
min	0.000000	0.000000
25%	10.000000	10.000000
50%	11.000000	10.000000
75%	12.000000	10.000000
max	1776.000000	170.000000

- Rating numerator and denominator are having higher max value which is strange

```
In [20]: # Unique values in rating_numerator
np.sort(archive.rating_numerator.unique())
```

```
Out[20]: array([  0,   1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
  11,  12,  13,  14,  15,  17,  20,  24,  26,  27,  44,
  45,  50,  60,  75,  80,  84,  88,  99, 121, 143, 144,
 165, 182, 204, 420, 666, 960, 1776], dtype=int64)
```

```
In [21]: # Unique values in rating_denominator
np.sort(archive.rating_denominator.unique())
```

```
Out[21]: array([ 0,  2,  7, 10, 11, 15, 16, 20, 40, 50, 70, 80, 90,
 110, 120, 130, 150, 170], dtype=int64)
```

Let's find out the rows which are having rating\_numerator greater than 14 and rating\_denominator is not equal to 10 and verify them with tweet text

```
In [22]: # Use set option expand the output display of text
pd.set_option('display.max_colwidth', None)
```

```
# Display full text to verify strange values in rating_numerator and rating_denominator
# where rating_numerator greater than 14 and rating_denominator is not equal to 10
text_display = archive.query('rating_numerator > 14 or rating_denominator != 10')[['tweet_text']]
text_display
```

```
Out[22]:
```

	tweet_id \
55	881633300179243008
188	855862651834028034
189	855860136149123072
285	838916489579200512
290	838150277551247360
291	838085839343206401
313	835246439529840640
340	832215909146226688
342	832088576586297345
433	820690176645140481
516	810984652412424192

695 786709082849828864  
763 778027034220126208  
784 775096608509886464  
902 758467244762497024  
979 749981277374128128  
1068 740373189193256964  
1120 731156023742988288  
1165 722974582966214656  
1202 716439118184652801  
1228 713900603437621249  
1254 710658690886586372  
1274 709198395643068416  
1351 704054845121142784  
1433 697463031882764288  
1598 686035780142297088  
1634 684225744407494656  
1635 684222868335505415  
1662 682962037429899265  
1663 682808988178739200  
1712 680494726643068929  
1779 677716515794329600  
1843 675853064436391936  
2074 670842764863651840  
2335 666287406224695296

55 @ro  
188  
189 @s8n You tried very hard to portray this good  
285 RT @Kib  
290  
291  
313 @jonnysun  
340 RT @dog\_rates: This is Logan, the Chow who lived. He  
342  
433 The floofs  
516 Meet Sam. She smiles 24/7 & secretly aspires to be a reindeer. \nKeep Sam smi  
695 This is Logan, the Chow who lived. He so  
763 This is Sophie. She's a Jubilant Bush Pupper. Super h\*ckin rare. Appears  
784 RT @dog\_rates: After so many requests, this is Breta  
902  
979  
1068 After so many requests, this is Bretagne. She was th  
1120 Say hello to this unbelievably we  
1165  
1202 This is Bluebert. He just saw  
1228 Happy  
1254 Here's a brigade of

1274 From left to right:\nCletus, Jerome, Alejandro, Burp, &amp;pp  
 1351  
 1433 Happ  
 1598 Yes I do realize a rating of 4/20 would've been  
 1634 Two sneaky puppers were not initially  
 1635 Someone help the girl is being mugged. Several are d  
 1662 This is Darrel. He just robbed a 7/11 and is in a h  
 1663 I'm aware that I could've said 20/16, but here at W  
 1712 Here we have uncov  
 1779  
 1843 Here we have an ent  
 2074  
 2335 This is an Albanian 3 1/2 legged Episcopalian.

	rating_numerator	rating_denominator
55	17	10
188	420	10
189	666	10
285	15	10
290	182	10
291	15	10
313	960	0
340	75	10
342	11	15
433	84	70
516	24	7
695	75	10
763	27	10
784	9	11
902	165	150
979	1776	10
1068	9	11
1120	204	170
1165	4	20
1202	50	50
1228	99	90
1254	80	80
1274	45	50
1351	60	50
1433	44	40
1598	4	20
1634	143	130
1635	121	110
1662	7	11
1663	20	16
1712	26	10
1779	144	120
1843	88	80

2074	420	10
2335	1	2

- The fact that the rating numerators are greater than the denominators does not need to be cleaned. This [unique rating system](#) is a big part of the popularity of WeRateDogs.
- Some Rating numerator and denominator not matching with the tweet text
- Decimal ratings are present for some tweets which is not matching with Rating numerator and denominator
- Rating numerator and denominator can be converted from int to float as the ratings have decimal values.

```
In [23]: # Get unique values
archive.name.value_counts()
```

```
Out[23]: None          745
a              55
Charlie        12
Cooper         11
Lucy           11
...
Dutch          1
Shnuggles      1
Staniel        1
Cal            1
Bobb           1
Name: name, Length: 957, dtype: int64
```

- Ambiguous names present, 'a' is the second most popular name which itself is not a name.

```
In [24]: # Unique dog names
archive.name.unique()
```

```
Out[24]: array(['Phineas', 'Tilly', 'Archie', 'Darla', 'Franklin', 'None', 'Jax',
                'Zoey', 'Cassie', 'Koda', 'Bruno', 'Ted', 'Stuart', 'Oliver',
                'Jim', 'Zeke', 'Ralphus', 'Canela', 'Gerald', 'Jeffrey', 'such',
                'Maya', 'Mingus', 'Derek', 'Roscoe', 'Waffles', 'Jimbo', 'Maisey',
                'Lilly', 'Earl', 'Lola', 'Kevin', 'Yogi', 'Noah', 'Bella',
                'Grizzwald', 'Rusty', 'Gus', 'Stanley', 'Alfy', 'Koko', 'Rey',
                'Gary', 'a', 'Elliot', 'Louis', 'Jesse', 'Romeo', 'Bailey',
                'Duddles', 'Jack', 'Emmy', 'Steven', 'Beau', 'Snoopy', 'Shadow',
                'Terrance', 'Aja', 'Penny', 'Dante', 'Nelly', 'Ginger', 'Benedict',
                'Venti', 'Goose', 'Nugget', 'Cash', 'Coco', 'Jed', 'Sebastian',
                'Walter', 'Sierra', 'Monkey', 'Harry', 'Kody', 'Lassie', 'Rover',
                'Napolean', 'Dawn', 'Boomer', 'Cody', 'Rumble', 'Clifford',
                'quite', 'Dewey', 'Scout', 'Gizmo', 'Cooper', 'Harold', 'Shikha',
                'Jamesy', 'Lili', 'Sammy', 'Meatball', 'Paisley', 'Albus',
                'Neptune', 'Quinn', 'Belle', 'Zooey', 'Dave', 'Jersey', 'Hobbes',
```



'Burt', 'Lorenzo', 'Carl', 'Jordy', 'Milky', 'Trooper', 'Winston',  
 'Sophie', 'Wyatt', 'Rosie', 'Thor', 'Oscar', 'Luna', 'Callie',  
 'Cermet', 'George', 'Marlee', 'Arya', 'Einstein', 'Alice',  
 'Rumpole', 'Benny', 'Aspen', 'Jarod', 'Wiggles', 'General',  
 'Sailor', 'Astrid', 'Iggy', 'Snoop', 'Kyle', 'Leo', 'Riley',  
 'Gidget', 'Noosh', 'Odin', 'Jerry', 'Charlie', 'Georgie', 'Rontu',  
 'Cannon', 'Furzey', 'Daisy', 'Tuck', 'Barney', 'Vixen', 'Jarvis',  
 'Mimosa', 'Pickles', 'Bungalo', 'Brady', 'Margo', 'Sadie', 'Hank',  
 'Tycho', 'Stephan', 'Indie', 'Winnie', 'Bentley', 'Ken', 'Max',  
 'Maddie', 'Pipsy', 'Monty', 'Sojourner', 'Odie', 'Arlo', 'Sunny',  
 'Vincent', 'Lucy', 'Clark', 'Mookie', 'Meera', 'Buddy', 'Ava',  
 'Rory', 'Eli', 'Ash', 'Tucker', 'Tobi', 'Chester', 'Wilson',  
 'Sunshine', 'Lipton', 'Gabby', 'Bronte', 'Poppy', 'Rhino',  
 'Willow', 'not', 'Orion', 'Eevee', 'Smiley', 'Logan', 'Moreton',  
 'Klein', 'Miguel', 'Emanuel', 'Kuyu', 'Dutch', 'Pete', 'Scooter',  
 'Reggie', 'Kyro', 'Samson', 'Loki', 'Mia', 'Malcolm', 'Dexter',  
 'Alfie', 'Fiona', 'one', 'Mutt', 'Bear', 'Doobert', 'Beebop',  
 'Alexander', 'Sailer', 'Brutus', 'Kona', 'Boots', 'Ralphie',  
 'Phil', 'Cupid', 'Pawnd', 'Pilot', 'Ike', 'Mo', 'Toby', 'Sweet',  
 'Pablo', 'Nala', 'Balto', 'Crawford', 'Gabe', 'Mattie', 'Jimison',  
 'Hercules', 'Duchess', 'Harlso', 'Sampson', 'Sundance', 'Luca',  
 'Flash', 'Finn', 'Peaches', 'Howie', 'Jazzy', 'Anna', 'Bo',  
 'Seamus', 'Wafer', 'Chelsea', 'Tom', 'Moose', 'Florence', 'Autumn',  
 'Dido', 'Eugene', 'Herschel', 'Strudel', 'Tebow', 'Chloe', 'Betty',  
 'Timber', 'Binky', 'Dudley', 'Comet', 'Larry', 'Levi', 'Akumi',  
 'Titan', 'Olivia', 'Alf', 'Oshie', 'Bruce', 'Chubbs', 'Sky',  
 'Atlas', 'Eleanor', 'Layla', 'Rocky', 'Baron', 'Tyr', 'Bauer',  
 'Swagger', 'Brandi', 'Mary', 'Moe', 'Halo', 'Augie', 'Craig',  
 'Sam', 'Hunter', 'Pavlov', 'Maximus', 'Wallace', 'Ito', 'Milo',  
 'Ollie', 'Cali', 'Lennon', 'incredibly', 'Major', 'Duke',  
 'Reginald', 'Sansa', 'Shooter', 'Django', 'Diogi', 'Sonny',  
 'Philbert', 'Marley', 'Severus', 'Ronnie', 'Anakin', 'Bones',  
 'Mauve', 'Chef', 'Doc', 'Sobe', 'Longfellow', 'Mister', 'Iroh',  
 'Baloo', 'Stubert', 'Paull', 'Timison', 'Davey', 'Pancake',  
 'Tyrone', 'Snicku', 'Ruby', 'Brody', 'Rizzy', 'Mack', 'Butter',  
 'Nimbus', 'Laika', 'Dobby', 'Juno', 'Maude', 'Lily', 'Newt',  
 'Benji', 'Nida', 'Robin', 'Monster', 'BeBe', 'Remus', 'Mabel',  
 'Misty', 'Happy', 'Mosby', 'Maggie', 'Leela', 'Ralphy', 'Brownie',  
 'Meyer', 'Stella', 'mad', 'Frank', 'Tonks', 'Lincoln', 'Oakley',  
 'Dale', 'Rizzo', 'Arnie', 'Pinot', 'Dallas', 'Hero', 'Frankie',  
 'Stormy', 'Mairi', 'Loomis', 'Godi', 'Kenny', 'Deacon', 'Timmy',  
 'Harper', 'Chipson', 'Combo', 'Dash', 'Bell', 'Hurley', 'Jay',  
 'Mya', 'Strider', 'an', 'Wesley', 'Solomon', 'Huck', 'very', 'O',  
 'Blue', 'Finley', 'Sprinkles', 'Heinrich', 'Shakespeare', 'Fizz',  
 'Chip', 'Grey', 'Roosevelt', 'Gromit', 'Willem', 'Dakota', 'Dixie',  
 'Al', 'Jackson', 'just', 'Carbon', 'DonDon', 'Kirby', 'Lou',  
 'Nollie', 'Chevy', 'Tito', 'Louie', 'Rupert', 'Rufus', 'Brudge',  
 'Shadoe', 'Colby', 'Angel', 'Brat', 'Tove', 'my', 'Aubie', 'Kota',

'Eve', 'Glenn', 'Shelby', 'Sephie', 'Bonaparte', 'Albert',  
 'Wishes', 'Rose', 'Theo', 'Rocco', 'Fido', 'Emma', 'Spencer',  
 'Lilli', 'Boston', 'Brandonald', 'Corey', 'Leonard', 'Chompsky',  
 'Beckham', 'Devón', 'Gert', 'Watson', 'Rubio', 'Keith', 'Dex',  
 'Carly', 'Ace', 'Tayzie', 'Grizzie', 'Fred', 'Gilbert', 'Zoe',  
 'Stewie', 'Calvin', 'Lilah', 'Spanky', 'Jameson', 'Piper',  
 'Atticus', 'Blu', 'Dietrich', 'Divine', 'Tripp', 'his', 'Cora',  
 'Huxley', 'Keurig', 'Bookstore', 'Linus', 'Abby', 'Shaggy',  
 'Shiloh', 'Gustav', 'Arlen', 'Percy', 'Lenox', 'Sugar', 'Harvey',  
 'Blanket', 'actually', 'Geno', 'Stark', 'Beya', 'Kilo', 'Kayla',  
 'Maxaroni', 'Doug', 'Edmund', 'Aqua', 'Theodore', 'Chase',  
 'getting', 'Rorie', 'Simba', 'Charles', 'Bayley', 'Axel',  
 'Storkson', 'Remy', 'Chadrick', 'Kellogg', 'Buckley', 'Livvie',  
 'Terry', 'Hermione', 'Ralpher', 'Aldrick', 'this', 'unacceptable',  
 'Rooney', 'Crystal', 'Ziva', 'Stefan', 'Pupcasso', 'Puff',  
 'Flurpson', 'Coleman', 'Enchilada', 'Raymond', 'all', 'Rueben',  
 'Cilantro', 'Karll', 'Sprout', 'Blitz', 'Bloop', 'Lillie',  
 'Ashleigh', 'Kreggory', 'Sarge', 'Luther', 'Ivar', 'Jangle',  
 'Schnitzel', 'Panda', 'Berkeley', 'Ralphé', 'Charleson', 'Clyde',  
 'Harnold', 'Sid', 'Pippa', 'Otis', 'Carper', 'Bowie',  
 'Alexanderson', 'Suki', 'Barclay', 'Skittle', 'Ebby', 'Flávio',  
 'Smokey', 'Link', 'Jennifur', 'Ozzy', 'Bluebert', 'Stephanus',  
 'Bubbles', 'old', 'Zeus', 'Bertson', 'Nico', 'Michelangelo',  
 'Siba', 'Calbert', 'Curtis', 'Travis', 'Thumas', 'Kanu', 'Lance',  
 'Opie', 'Kane', 'Olive', 'Chuckles', 'Staniel', 'Sora', 'Beemo',  
 'Gunner', 'infuriating', 'Lacy', 'Tater', 'Olaf', 'Cecil', 'Vince',  
 'Karma', 'Billy', 'Walker', 'Rodney', 'Klevin', 'Malikai',  
 'Bobble', 'River', 'Jebberson', 'Remington', 'Farfle', 'Jiminus',  
 'Clarkus', 'Finnegus', 'Cupcake', 'Kathmandu', 'Ellie', 'Katie',  
 'Kara', 'Adele', 'Zara', 'Ambrose', 'Jimothy', 'Bode', 'Terrenth',  
 'Reese', 'Chesterson', 'Lucia', 'Bisquick', 'Ralphson', 'Socks',  
 'Rambo', 'Rudy', 'Fiji', 'Rilo', 'Bilbo', 'Coopson', 'Yoda',  
 'Millie', 'Chet', 'Crouton', 'Daniel', 'Kaia', 'Murphy', 'Dotsy',  
 'Eazy', 'Coops', 'Fillup', 'Miley', 'Charl', 'Reagan', 'Yukon',  
 'CeCe', 'Cuddles', 'Claude', 'Jessiga', 'Carter', 'Ole', 'Pherb',  
 'Blipson', 'Reptar', 'Trevith', 'Berb', 'Bob', 'Colin', 'Brian',  
 'Olivier', 'Grady', 'Kobe', 'Freddery', 'Bodie', 'Dunkin', 'Wally',  
 'Tupawc', 'Amber', 'Edgar', 'Teddy', 'Kingsley', 'Brockly',  
 'Richie', 'Molly', 'Vinscent', 'Cedrick', 'Hazel', 'Lolo', 'Eriq',  
 'Phred', 'the', 'Oddie', 'Maxwell', 'Geoff', 'Covach', 'Durg',  
 'Fynn', 'Ricky', 'Herald', 'Lucky', 'Ferg', 'Trip', 'Clarence',  
 'Hamrick', 'Brad', 'Pubert', 'Frönq', 'Derby', 'Lizzie', 'Ember',  
 'Blakely', 'Opal', 'Marq', 'Kramer', 'Barry', 'Gordon', 'Baxter',  
 'Mona', 'Horace', 'Crimson', 'Birf', 'Hammond', 'Lorelei', 'Marty',  
 'Brooks', 'Petrick', 'Hubertson', 'Gerbald', 'Oreo', 'Bruiser',  
 'Perry', 'Bobby', 'Jeph', 'Obi', 'Tino', 'Kulet', 'Sweets', 'Lupe',  
 'Tiger', 'Jiminy', 'Griffin', 'Banjo', 'Brandy', 'Lulu', 'Darrel',  
 'Taco', 'Joey', 'Patrick', 'Kreg', 'Todo', 'Tess', 'Ulysses',

```
'Toffee', 'Apollo', 'Asher', 'Glacier', 'Chuck', 'Champ', 'Ozzie',
'Griswold', 'Cheesy', 'Moofasa', 'Hector', 'Goliath', 'Kawhi',
'by', 'Emmie', 'Penelope', 'Willie', 'Rinna', 'Mike', 'William',
'Dwight', 'Evy', 'officially', 'Rascal', 'Linda', 'Tug', 'Tango',
'Grizz', 'Jerome', 'Crumpet', 'Jessifer', 'Izzy', 'Ralph', 'Sandy',
'Humphrey', 'Tassy', 'Juckson', 'Chuq', 'Tyrus', 'Karl',
'Godzilla', 'Vinnie', 'Kenneth', 'Herm', 'Bert', 'Striker',
'Donny', 'Pepper', 'Bernie', 'Buddah', 'Lenny', 'Arnold', 'Zuzu',
'Mollie', 'Laela', 'Tedders', 'Superpup', 'Rufio', 'Jeb', 'Rodman',
'Jonah', 'Chesney', 'life', 'Henry', 'Bobbay', 'Mitch', 'Kaiya',
'Acro', 'Aiden', 'Obie', 'Dot', 'Shnuggles', 'Kendall', 'Jeffri',
'Steve', 'Mac', 'Fletcher', 'Kenzie', 'Pumpkin', 'Schnozz',
'Gustaf', 'Cheryl', 'Ed', 'Leonidas', 'Norman', 'Caryl', 'Scott',
'Taz', 'Darby', 'Jackie', 'light', 'Jazz', 'Franq', 'Pippin',
'Rolf', 'Snickers', 'Ridley', 'Cal', 'Bradley', 'Bubba', 'Tuco',
'Patch', 'Mojo', 'Batdog', 'Dylan', 'space', 'Mark', 'JD',
'Alejandro', 'Scruffers', 'Pip', 'Julius', 'Tanner', 'Sparky',
'Anthony', 'Holly', 'Jett', 'Amy', 'Sage', 'Andy', 'Mason',
'Trigger', 'Antony', 'Creg', 'Traviss', 'Gin', 'Jeffrie', 'Danny',
'Ester', 'Pluto', 'Bloo', 'Edd', 'Willy', 'Herb', 'Damon',
'Peanut', 'Nigel', 'Butters', 'Sandra', 'Fabio', 'Randall', 'Liam',
'Tommy', 'Ben', 'Raphael', 'Julio', 'Andru', 'Kloey', 'Shawwn',
'Skye', 'Kollin', 'Ronduh', 'Billl', 'Saydee', 'Dug', 'Tessa',
'Sully', 'Kirk', 'Ralf', 'Clarq', 'Jaspers', 'Samsom', 'Harrison',
'Chaz', 'Jeremy', 'Jaycob', 'Lambeau', 'Ruffles', 'Amélie', 'Bobb',
'Banditt', 'Kevon', 'Winifred', 'Hanz', 'Churlie', 'Zeek',
'Timofy', 'Maks', 'Jomathan', 'Kallie', 'Marvin', 'Spark',
'Gòrdón', 'Jo', 'DayZ', 'Jareld', 'Torque', 'Ron', 'Skittles',
'Cleopatricia', 'Erik', 'Stu', 'Tedrick', 'Filup', 'Kial',
'Naphaniel', 'Dook', 'Hall', 'Philippe', 'Biden', 'Fwed',
'Genevieve', 'Joshwa', 'Bradlay', 'Clybe', 'Keet', 'Carll',
'Jockson', 'Josep', 'Lugan', 'Christoper'], dtype=object)
```

- Names which contains all the characters as lowercase seems dubious like 'a', 'an', 'the', etc.

```
In [25]: # Get dubious names
```

```
archive.name[archive.name.str.islower()].value_counts()
```

```
Out[25]: a          55
         the         8
         an          7
         very        5
         just         4
         one         4
         quite        4
         not          2
         mad          2
```

```

getting      2
actually     2
old          1
unacceptable 1
this         1
infuriating  1
incredibly   1
light        1
my           1
by           1
his          1
such         1
all          1
space        1
life         1
officially   1
Name: name, dtype: int64

```

- Incorrect dog names extracted from text

```

In [26]: # number of unique values in each dog stages
archive[['doggo', 'floofer', 'pupper', 'puppo']].apply(pd.Series.value_counts)

```

```

Out[26]:

```

	doggo	floofer	pupper	puppo
None	2259.0	2346.0	2099.0	2326.0
doggo	97.0	NaN	NaN	NaN
floofer	NaN	10.0	NaN	NaN
pupper	NaN	NaN	257.0	NaN
puppo	NaN	NaN	NaN	30.0

- Individual dog stages are having lot of none values which can be arranged into a single column.

## Image Prediction

```

In [27]: # Brief summary of DataFrame to check missing or possibly errant data
img_pred.info()

```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2075 entries, 0 to 2074
Data columns (total 12 columns):
 #   Column      Non-Null Count  Dtype
---  -
0   tweet_id    2075 non-null  int64
1   jpg_url     2075 non-null  object
2   img_num     2075 non-null  int64
3   p1          2075 non-null  object
4   p1_conf     2075 non-null  float64
5   p1_dog      2075 non-null  bool

```

```

6   p2          2075 non-null   object
7   p2_conf     2075 non-null   float64
8   p2_dog      2075 non-null   bool
9   p3          2075 non-null   object
10  p3_conf     2075 non-null   float64
11  p3_dog      2075 non-null   bool
dtypes: bool(3), float64(3), int64(2), object(4)
memory usage: 152.1+ KB

```

- Erroneous datatype for tweet\_id *int64* instead of *string*

```

In [28]: # check for duplicate data
img_pred.duplicated().sum()

```

```

Out[28]: 0

```

```

In [29]: # check null values
img_pred.isna().sum()

```

```

Out[29]: tweet_id    0
        jpg_url     0
        img_num     0
        p1          0
        p1_conf     0
        p1_dog      0
        p2          0
        p2_conf     0
        p2_dog      0
        p3          0
        p3_conf     0
        p3_dog      0
        dtype: int64

```

```

In [30]: # number of unique elements in image predictions
img_pred.nunique()

```

```

Out[30]: tweet_id    2075
        jpg_url     2009
        img_num      4
        p1          378
        p1_conf     2006
        p1_dog       2
        p2          405
        p2_conf     2004
        p2_dog       2
        p3          408
        p3_conf     2006
        p3_dog       2
        dtype: int64

```

```
In [31]: # number of unique values in each dog breed
img_pred[['p1_dog', 'p2_dog', 'p3_dog']].apply(pd.Series.value_counts)
```

```
Out[31]:
```

	p1_dog	p2_dog	p3_dog
True	1532	1553	1499
False	543	522	576

```
In [32]: # Concise summary statistics of prediction confidence levels
img_pred[['p1_conf', 'p2_conf', 'p3_conf']].describe()
```

```
Out[32]:
```

	p1_conf	p2_conf	p3_conf
count	2075.000000	2.075000e+03	2.075000e+03
mean	0.594548	1.345886e-01	6.032417e-02
std	0.271174	1.006657e-01	5.090593e-02
min	0.044333	1.011300e-08	1.740170e-10
25%	0.364412	5.388625e-02	1.622240e-02
50%	0.588230	1.181810e-01	4.944380e-02
75%	0.843855	1.955655e-01	9.180755e-02
max	1.000000	4.880140e-01	2.734190e-01

- Most confident image predictions are enough

## Tweets

```
In [33]: # Brief summary of DataFrame to check missing or possibly errant data
tweet_api.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2328 entries, 0 to 2327
Data columns (total 3 columns):
#   Column          Non-Null Count  Dtype
---  -
0   tweet_id        2328 non-null   int64
1   favorite_count  2328 non-null   int64
2   retweet_count   2328 non-null   int64
dtypes: int64(3)
memory usage: 54.7 KB
```

- Erroneous datatype for tweet\_id *int64* instead of *string*

```
In [34]: # check for duplicated values
tweet_api.duplicated().sum()
```

```
Out[34]: 0
```

```
In [35]: # check for null values
tweet_api.isna().sum()
```