

# wrangle\_act

May 2, 2020

## 1 Project - Wrangle and Analyse Data (WeRate Dogs)

### 1.1 Introduction:

WeRateDogs (@dog\_rates) [[https://twitter.com/dog\\_rate](https://twitter.com/dog_rate)] is a Twitter account that rates people's dogs with a humorous comment about the dog. The twitter archive contains tweet data for over 5000+ tweets that includes information like individual comments, ratings and timestamp of users who posted the tweet and replied to it. Tweets that do not include any ratings are filtered out for our analysis.

Using, 'Tweepy' [<http://www.tweepy.org>] a python library for accessing the Twitter API, we can query additional information from the tweet archive such as the retweet count and favorites count. We can later read this JSON data into our pandas dataframe to perform our analysis. Additionally, we can classify the breed of dogs (via some form of neural network) and fetch them programtically through the 'Requests' Library [<https://pypi.org/project/requests/>] to include information such as images and predictions for dogs.

Objective: Our objective is to gather, assess and clean this real-world data using various python libraries (like Numpy, Pandas, Requests, JSON and Tweepy). And to present our analysis and visualisations in a well documented manner including efforts put in the data-wrangling process and numerous insights gathered from these findings.

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## References

### ## Gathering Data

```
In [166]: # Importing the Required Libraries suitable for our given analysis
import numpy as np
import pandas as pd
import requests
import json
import time
import math
import re
import tweepy
from tweepy import OAuthHandler
from timeit import default_timer as timer
import matplotlib.pyplot as plt
import matplotlib.style as style
import seaborn as sns
%matplotlib inline
```

### ### Twitter Enhanced Archives: Using the Pandas Library

```
In [3]: # Reading the Twitter Enhanced Archives using the pd.read_csv() function
dfarch = pd.read_csv('twitter-archive-enhanced.csv', parse_dates=True)
dfarch.head()
```

```
Out[3]:
```

	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

```

### ### Twitter Image Predictions: Using Requests Library

```

In [4]: # Reading the Twitter Image Predictions using the Requests Library
url = "https://d17h27t6h515a5.cloudfront.net/topher/2017/August/599fd2ad_image-predictions-2017-08-24/image-predictions-2017-08-24.tsv"
response = requests.get(url)
response.status_code
with open('image-predictions.tsv', mode='wb') as file:
    file.write(response.content)
# Reading the Twitter Image Predictions file into an Pandas DataFrame
dfpred = pd.read_csv('image-predictions.tsv', sep='\t')
dfpred.head()

```

```

Out[4]:
   tweet_id  jpg_url
0  666020888022790149  https://pbs.twimg.com/media/CT4udnOWwAA0aMy.jpg
1  666029285002620928  https://pbs.twimg.com/media/CT42GRgUYAA5iDo.jpg
2  666033412701032449  https://pbs.twimg.com/media/CT4521TWwAEvMyu.jpg

```

```

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

```

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

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

### ### Twitter Additional Data API: Using Tweepy Library

```

In [4]: # Signing up for Twitter Developer account and Creating Application to generate access tokens
        twitter_keys = {
            'CONSUMER_KEY': " ",
            'CONSUMER_TOKEN': " ",
            'ACCESS_TOKEN_KEY': " ",
            'ACCESS_TOKEN_SECRET': " "
        }

        # Registering our Client Application with Twitter by passing the consumer tokens
        auth = tweepy.OAuthHandler(twitter_keys['CONSUMER_KEY'], twitter_keys['CONSUMER_TOKEN'])
        auth.set_access_token(twitter_keys['ACCESS_TOKEN_KEY'], twitter_keys['ACCESS_TOKEN_SECRET'])

        # Setting the time-limits to automatically fetch data upon expiring of given timeframe
        api = tweepy.API(auth_handler=auth, wait_on_rate_limit=True, wait_on_rate_limit_notify=True)

        # Using TweetIDs for which we need to gather additional data via Twitter API
        tweet_ids = dfarch.tweet_id.values
        len(tweet_ids)

        # Querying Twitter API for JSON data for each TweetID in the Twitter Archive
        count = 0
        fails_dict = {}
        start = timer()

        # Saving those returned tweets line by line into a suitable text 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  
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24: 887473957103951883  
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2176: 669214165781868544  
Success  
2177: 669203728096960512  
Success  
2178: 669037058363662336  
Success  
2179: 669015743032369152  
Success  
2180: 669006782128353280  
Success  
2181: 669000397445533696  
Success  
2182: 668994913074286592  
Success  
2183: 668992363537309700  
Success  
2184: 668989615043424256  
Success  
2185: 668988183816871936  
Success  
2186: 668986018524233728  
Success  
2187: 668981893510119424  
Success  
2188: 668979806671884288  
Success  
2189: 668975677807423489  
Success  
2190: 668967877119254528  
Success  
2191: 668960084974809088  
Success  
2192: 668955713004314625  
Success  
2193: 668932921458302977  
Success  
2194: 668902994700836864  
Success  
2195: 668892474547511297  
Success  
2196: 668872652652679168  
Success  
2197: 668852170888998912  
Success  
2198: 668826086256599040



Success  
2199: 668815180734689280  
Success  
2200: 668779399630725120  
Success  
2201: 668655139528511488  
Success  
2202: 668645506898350081  
Success  
2203: 668643542311546881  
Success  
2204: 668641109086707712  
Success  
2205: 668636665813057536  
Success  
2206: 668633411083464705  
Success  
2207: 668631377374486528  
Success  
2208: 668627278264475648  
Success  
2209: 668625577880875008  
Success  
2210: 668623201287675904  
Success  
2211: 668620235289837568  
Success  
2212: 668614819948453888  
Success  
2213: 668587383441514497  
Success  
2214: 668567822092664832  
Success  
2215: 668544745690562560  
Success  
2216: 668542336805281792  
Success  
2217: 668537837512433665  
Success  
2218: 668528771708952576  
Success  
2219: 668507509523615744  
Success  
2220: 668496999348633600  
Success  
2221: 668484198282485761  
Success  
2222: 668480044826800133

Success  
2223: 668466899341221888  
Success  
2224: 668297328638447616  
Success  
2225: 668291999406125056  
Success  
2226: 668286279830867968  
Success  
2227: 668274247790391296  
Success  
2228: 668268907921326080  
Success  
2229: 668256321989451776  
Success  
2230: 668248472370458624  
Success  
2231: 668237644992782336  
Success  
2232: 668226093875376128  
Success  
2233: 668221241640230912  
Success  
2234: 668204964695683073  
Success  
2235: 668190681446379520  
Success  
2236: 668171859951755264  
Success  
2237: 668154635664932864  
Success  
2238: 668142349051129856  
Success  
2239: 668113020489474048  
Success  
2240: 667937095915278337  
Success  
2241: 667924896115245057  
Success  
2242: 667915453470232577  
Success  
2243: 667911425562669056  
Success  
2244: 667902449697558528  
Success  
2245: 667886921285246976  
Success  
2246: 667885044254572545

Success  
2247: 667878741721415682  
Success  
2248: 667873844930215936  
Success  
2249: 66786672429387760  
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
2208.233114097
{888202515573088257: TweepError([{'code': 144, 'message': 'No status found with that ID.'}]), 87

```

```

In [5]: # Creating a list of dictionaries to read JSON line by line and later converting it to a
df_list =[]

# Using json.loads() function to read file
with open('tweet_json.txt',encoding = 'utf-8') as json_file:
    for line in json_file:
        json_data = json.loads(line)
        df_list.append({
            'tweet_id': json_data['id'],
            'favorites': json_data['favorite_count'],
            'retweets': json_data['retweet_count']})

# Creating a Pandas Dataframe with the selected appropriate columns
dfapi = pd.DataFrame(df_list, columns=['tweet_id', 'favorites', 'retweets'])
dfapi.head()

```

```
Out[5]:
```

	tweet_id	favorites	retweets
0	892420643555336193	36331	7729
1	892177421306343426	31306	5725
2	891815181378084864	23585	3787
3	891689557279858688	39627	7887
4	891327558926688256	37820	8515

## ## Assessing Data

```
In [38]: # Printing the first few rows of the Twitter Archives using head() function
dfarch.head()
```

```
Out[38]:
```

	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

### Twitter Archive Columns (Explained)

- tweet\_id: Unique Identifier
- in\_reply\_to\_status\_id: If Reply, Original TweetID
- in\_reply\_to\_user\_id: If Reply, Original AuthorID
- timestamp: Time of Tweet
- source: Twitter for Android, Twitter for iPhone, Twitter Web Client
- text: Actual Tweet
- retweeted\_status\_id: If Retweet, Original TweetID
- retweeted\_status\_user\_id: If Retweet, Original AuthorID
- retweeted\_status\_timestamp: Time of ReTweet
- expanded\_urls: Tweet URL
- rating\_numerator: Numerator of Rating
- rating\_denominator: Denominator of Rating
- name: Name of Dog
- doggo: One of the 4 Dog Stage
- floofer: One of the 4 Dog Stage
- pupper: One of the 4 Dog Stage
- puppo: One of the 4 Dog Stage

In [23]: *# Printing the summary information of Twitter Archives using info() function*  
dfarch.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

In [25]: *# Printing the rows and columns for Twitter Archives using shape attribute*  
dfarch.shape

Out[25]: (2356, 17)

In [26]: *# Printing the summary statistics of Twitter Archives using describe() function*  
dfarch.describe()

```

Out[26]:
      tweet_id  in_reply_to_status_id  in_reply_to_user_id  \
count  2.356000e+03                7.800000e+01          7.800000e+01
mean    7.427716e+17                7.455079e+17          2.014171e+16
std     6.856705e+16                7.582492e+16          1.252797e+17
min     6.660209e+17                6.658147e+17          1.185634e+07
25%     6.783989e+17                6.757419e+17          3.086374e+08
50%     7.196279e+17                7.038708e+17          4.196984e+09
75%     7.993373e+17                8.257804e+17          4.196984e+09
max     8.924206e+17                8.862664e+17          8.405479e+17

      retweeted_status_id  retweeted_status_user_id  rating_numerator  \
count      1.810000e+02                1.810000e+02          2356.000000
mean       7.720400e+17                1.241698e+16           13.126486
std        6.236928e+16                9.599254e+16          45.876648
min        6.661041e+17                7.832140e+05           0.000000
25%        7.186315e+17                4.196984e+09          10.000000
50%        7.804657e+17                4.196984e+09          11.000000
75%        8.203146e+17                4.196984e+09          12.000000
max        8.874740e+17                7.874618e+17          1776.000000

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

```

```
75%          10.000000
max          170.000000
```

```
In [31]: # Reading random samples from the Twitter Image Predictions using sample() function
dfpred.sample(5)
```

```
Out[31]:
```

	tweet_id	jpg_url	\
1074	717009362452090881	https://pbs.twimg.com/media/CfNUNetW8AAekHx.jpg	
339	672245253877968896	https://pbs.twimg.com/media/CVRLfeoW4AA_ldZ.jpg	
1458	777885040357281792	https://pbs.twimg.com/media/CsuaUH2WAAAWJh1.jpg	
1759	825829644528148480	https://pbs.twimg.com/media/C3XvqILXUAU2nnT.jpg	
844	695074328191332352	https://pbs.twimg.com/media/CaVmajOWYAA1uNG.jpg	

	img_num	p1	p1_conf	p1_dog	p2	p2_conf	\
1074	1	Siberian_husky	0.506154	True	Eskimo_dog	0.269656	
339	1	Chihuahua	0.718944	True	badger	0.178546	
1458	1	Afghan_hound	0.123529	True	basset	0.119682	
1759	2	Great_Pyrenees	0.853407	True	golden_retriever	0.053531	
844	1	Shih-Tzu	0.510106	True	Tibetan_terrier	0.071981	

	p2_dog	p3	p3_conf	p3_dog
1074	True	malamute	0.060658	True
339	False	toy_terrier	0.037103	True
1458	True	Siberian_husky	0.108709	True
1759	True	English_setter	0.045830	True
844	True	Lhasa	0.069231	True

### Tweet Predictions Columns (Explained)

- tweet\_id: Unique Identifier
- jpg\_url: Dog Image URL
- img\_num: Image Number (1-4)
- p1: First Prediction for Image
- p1\_conf: Confidence(%) First Prediction
- p2: Second Prediction for Image
- p2\_conf: Confidence(%) Second Prediction
- p3: Third Prediction for Image
- p3\_conf: Confidence(%) Third Prediction

```
In [33]: # Printing the datatypes for Twitter Image Predictions using the dtypes attribute
dfpred.dtypes
```

```
Out[33]: tweet_id      int64
jpg_url      object
img_num      int64
p1           object
p1_conf      float64
p1_dog       bool
p2           object
```

```

p2_conf      float64
p2_dog       bool
p3           object
p3_conf      float64
p3_dog       bool
dtype: object

```

```

In [49]: # Printing the last few rows from Twitter Additional Data API using the tail() function
dfapi.tail()

```

```

Out[49]:
      tweet_id  favorites  retweets
2325  666049248165822465      96      40
2326  666044226329800704     272     132
2327  666033412701032449     112      41
2328  666029285002620928     121      42
2329  666020888022790149    2423     463

```

### Twitter API Columns (Explained)

- tweet\_id: Unique Identifier
- favorites: Number of Likes by Users
- retweets: Number of Retweets by Users

```

In [6]: # Sorting ratings(Numerator) in Twitter Archives using the value_counts() function
dfarch.rating_numerator.value_counts()

```

```

Out[6]:
12      558
11      464
10      461
13      351
9       158
8       102
7        55
14       54
5        37
6        32
3        19
4        17
1         9
2         9
420       2
0         2
15        2
75        2
80        1
20        1
24        1
26        1
44        1

```

50	1
60	1
165	1
84	1
88	1
144	1
182	1
143	1
666	1
960	1
1776	1
17	1
27	1
45	1
99	1
121	1
204	1

Name: rating\_numerator, dtype: int64

In [9]: *# Sorting ratings(Denominator) in Twitter Archives using the value\_counts() function*  
dfarch.rating\_denominator.value\_counts()

Out[9]:

10	2333
11	3
50	3
80	2
20	2
2	1
16	1
40	1
70	1
15	1
90	1
110	1
120	1
130	1
150	1
170	1
7	1
0	1

Name: rating\_denominator, dtype: int64

In [20]: *# Sorting the names in Twitter Archives using the value\_counts() function*  
dfarch.name.value\_counts()

Out[20]:

None	745
a	55
Charlie	12
Lucy	11

```

Cooper      11
...
Ben         1
Monty       1
Danny       1
Arlo        1
Enchilada   1
Name: name, Length: 957, dtype: int64

```

```

In [8]: # Checking duplicate TweetIDs in Twitter Archives using duplicated() function
dfarch.tweet_id.duplicated().sum()

```

```

Out[8]: 0

```

```

In [10]: # Checking duplicate image URLs in Twitter Image Predictions using duplicated() function
dfpred.jpg_url.duplicated().sum()

```

```

Out[10]: 66

```

```

In [41]: # Finding unusual dog names in Twitter Archives using the len() and apply() function
dfarch[dfarch['name'].apply(len) < 3]

```

```

Out[41]:
      tweet_id  in_reply_to_status_id  in_reply_to_user_id \
56    881536004380872706              NaN              NaN
393    825876512159186944              NaN              NaN
446    819015337530290176              NaN              NaN
449    819004803107983360              NaN              NaN
553    804026241225523202              NaN              NaN
...          ...          ...          ...
2349   666051853826850816              NaN              NaN
2350   666050758794694657              NaN              NaN
2352   666044226329800704              NaN              NaN
2353   666033412701032449              NaN              NaN
2354   666029285002620928              NaN              NaN

      timestamp \
56    2017-07-02 15:32:16 +0000
393    2017-01-30 01:21:19 +0000
446    2017-01-11 02:57:27 +0000
449    2017-01-11 02:15:36 +0000
553    2016-11-30 18:16:08 +0000
...          ...
2349    2015-11-16 00:35:11 +0000
2350    2015-11-16 00:30:50 +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

```

```

source \

```

```

56 <a href="http://twitter.com/download/iphone" r...
393 <a href="http://twitter.com/download/iphone" r...
446 <a href="http://twitter.com/download/iphone" r...
449 <a href="http://twitter.com/download/iphone" r...
553 <a href="http://twitter.com/download/iphone" r...
...
2349 <a href="http://twitter.com/download/iphone" r...
2350 <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...

```

	text	retweeted_status_id \
56	Here is a pupper approaching maximum borkdrive...	NaN
393	This is Mo. No one will push him around in the...	NaN
446	RT @dog_rates: This is Bo. He was a very good ...	8.190048e+17
449	This is Bo. He was a very good First Doggo. 14...	NaN
553	This is Bo. He's going to make me cry. 13/10 p...	NaN
...	...	...
2349	This is an odd dog. Hard on the outside but lo...	NaN
2350	This is a truly beautiful English Wilson Staff...	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

	retweeted_status_user_id	retweeted_status_timestamp \
56	NaN	NaN
393	NaN	NaN
446	4.196984e+09	2017-01-11 02:15:36 +0000
449	NaN	NaN
553	NaN	NaN
...	...	...
2349	NaN	NaN
2350	NaN	NaN
2352	NaN	NaN
2353	NaN	NaN
2354	NaN	NaN

	expanded_urls	rating_numerator \
56	https://twitter.com/dog_rates/status/881536004...	14
393	https://twitter.com/dog_rates/status/825876512...	11
446	https://twitter.com/dog_rates/status/819004803...	14
449	https://twitter.com/dog_rates/status/819004803...	14
553	https://twitter.com/dog_rates/status/804026241...	13
...	...	...
2349	https://twitter.com/dog_rates/status/666051853...	2
2350	https://twitter.com/dog_rates/status/666050758...	10
2352	https://twitter.com/dog_rates/status/666044226...	6

2353	<a href="https://twitter.com/dog_rates/status/666033412...">https://twitter.com/dog_rates/status/666033412...</a>	9
2354	<a href="https://twitter.com/dog_rates/status/666029285...">https://twitter.com/dog_rates/status/666029285...</a>	7

	rating_denominator	name	doggo	floofer	pupper	puppo
56	10	a	None	None	pupper	None
393	10	Mo	None	None	None	None
446	10	Bo	doggo	None	None	None
449	10	Bo	doggo	None	None	None
553	10	Bo	None	None	None	None
...	...	...	...	...	...	...
2349	10	an	None	None	None	None
2350	10	a	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

[79 rows x 7 columns]

```
In [12]: # Checking records with retweets in Twitter Archives using notnull() function
dfarch[dfarch['retweeted_status_id'].notnull()]
dfarch[dfarch['retweeted_status_user_id'].notnull()]
```

```
Out[12]:
```

	tweet_id	in_reply_to_status_id	in_reply_to_user_id	\
19	888202515573088257	NaN	NaN	
32	886054160059072513	NaN	NaN	
36	885311592912609280	NaN	NaN	
68	879130579576475649	NaN	NaN	
73	878404777348136964	NaN	NaN	
...	...	...	...	
1023	746521445350707200	NaN	NaN	
1043	743835915802583040	NaN	NaN	
1242	711998809858043904	NaN	NaN	
2259	667550904950915073	NaN	NaN	
2260	667550882905632768	NaN	NaN	

	timestamp	\
19	2017-07-21 01:02:36 +0000	
32	2017-07-15 02:45:48 +0000	
36	2017-07-13 01:35:06 +0000	
68	2017-06-26 00:13:58 +0000	
73	2017-06-24 00:09:53 +0000	
...	...	
1023	2016-06-25 01:52:36 +0000	
1043	2016-06-17 16:01:16 +0000	
1242	2016-03-21 19:31:59 +0000	
2259	2015-11-20 03:51:52 +0000	
2260	2015-11-20 03:51:47 +0000	



	source \			
19	<a href="http://twitter.com/download/iphone" r...			
32	<a href="http://twitter.com/download/iphone" r...			
36	<a href="http://twitter.com/download/iphone" r...			
68	<a href="http://twitter.com/download/iphone" r...			
73	<a href="http://twitter.com/download/iphone" r...			
...	...			
1023	<a href="http://twitter.com/download/iphone" r...			
1043	<a href="http://twitter.com/download/iphone" r...			
1242	<a href="http://twitter.com/download/iphone" r...			
2259	<a href="http://twitter.com" rel="nofollow">Tw...			
2260	<a href="http://twitter.com" rel="nofollow">Tw...			

	text	retweeted_status_id \
19	RT @dog_rates: This is Canela. She attempted s...	8.874740e+17
32	RT @Athletics: 12/10 #BATP https://t.co/WxwJmv...	8.860537e+17
36	RT @dog_rates: This is Lilly. She just paralle...	8.305833e+17
68	RT @dog_rates: This is Emmy. She was adopted t...	8.780576e+17
73	RT @dog_rates: Meet Shadow. In an attempt to r...	8.782815e+17
...	...	...
1023	RT @dog_rates: This is Shaggy. He knows exactl...	6.678667e+17
1043	RT @dog_rates: Extremely intelligent dog here...	6.671383e+17
1242	RT @twitter: @dog_rates Awesome Tweet! 12/10. ...	7.119983e+17
2259	RT @dogratingrating: Exceptional talent. Origi...	6.675487e+17
2260	RT @dogratingrating: Unoriginal idea. Blatant ...	6.675484e+17

	retweeted_status_user_id	retweeted_status_timestamp \
19	4.196984e+09	2017-07-19 00:47:34 +0000
32	1.960740e+07	2017-07-15 02:44:07 +0000
36	4.196984e+09	2017-02-12 01:04:29 +0000
68	4.196984e+09	2017-06-23 01:10:23 +0000
73	4.196984e+09	2017-06-23 16:00:04 +0000
...	...	...
1023	4.196984e+09	2015-11-21 00:46:50 +0000
1043	4.196984e+09	2015-11-19 00:32:12 +0000
1242	7.832140e+05	2016-03-21 19:29:52 +0000
2259	4.296832e+09	2015-11-20 03:43:06 +0000
2260	4.296832e+09	2015-11-20 03:41:59 +0000

	expanded_urls	rating_numerator \
19	https://twitter.com/dog_rates/status/887473957...	13
32	https://twitter.com/dog_rates/status/886053434...	12
36	https://twitter.com/dog_rates/status/830583320...	13
68	https://twitter.com/dog_rates/status/878057613...	14
73	https://www.gofundme.com/3yd6y1c,https://twitt...	13
...	...	...
1023	https://twitter.com/dog_rates/status/667866724...	10
1043	https://twitter.com/dog_rates/status/667138269...	10

```

1242 https://twitter.com/twitter/status/71199827977... 12
2259 https://twitter.com/dogratingrating/status/667... 12
2260 https://twitter.com/dogratingrating/status/667... 5

```

	rating_denominator	name	doggo	floofer	pupper	puppo
19	10	Canela	None	None	None	None
32	10	None	None	None	None	None
36	10	Lilly	None	None	None	None
68	10	Emmy	None	None	None	None
73	10	Shadow	None	None	None	None
...	...	...	...	...	...	...
1023	10	Shaggy	None	None	None	None
1043	10	None	None	None	None	None
1242	10	None	None	None	None	None
2259	10	None	None	None	None	None
2260	10	None	None	None	None	None

```
[181 rows x 7 columns]
```

## ## Cleaning Data

```

In [6]: # Creating copies of Twitter Archives, Twitter Predictions, Twitter Data API before cleaning
        archives_clean = dfarch.copy()
        predictions_clean = dfpred.copy()
        api_clean = dfapi.copy()

```

## ## Quality Issues Incomplete, Inconsistent, Invalid Data (Content Issues)

**Twitter Archives** 1. retweeted\_status\_id and retweeted\_status\_user\_id: Consists Retweets (Duplicates) 2. text: Getting rid of Retweets starting with 'RT' in Text Column 3. rating: Creating new Rating Column with Numerator & Denominator 4. rating\_numerator, rating\_denominator: Missing Column (Fraction) 5. name('None', 'a', 'an'): Invalid Names, Less than three characters 6. source: Removing HTTP Code in Source Column 7. in\_reply\_to\_status\_id, in\_reply\_to\_user\_id, timestamp: Have Erroneous Data Types

**Twitter Predictions** 8. tweet\_id: Missing Tweets across Archives and Predictions

### 1.2.1 Issue #1: retweeted\_status\_id and retweeted\_status\_user\_id: Consists Retweets (Duplicates)

**Define** Keep only those rows in Twitter Archives that have original tweets OR Delete rows where (retweeted\_status\_id/retweeted\_status\_user\_id) is not null.

## Code

```

In [7]: archives_clean = archives_clean[archives_clean.retweeted_status_id.isnull()]
        archives_clean = archives_clean[archives_clean.retweeted_status_user_id.isnull()]

```

## Test

```
In [8]: len(archives_clean[archives_clean.retweeted_status_id.isnull() == False])
        len(archives_clean[archives_clean.retweeted_status_user_id.isnull() == False])
```

```
Out[8]: 0
```

## 1.2.2 Issue #2: text: Getting rid of Retweets starting with 'RT' in Text Column

**Define** The text column in Tweet Archives contains some Retweets that begin with 'RT' that need to be removed.

### Code

```
In [9]: archives_clean = archives_clean.loc[archives_clean['text'].str.startswith('RT') == False]
```

### Test

```
In [10]: archives_clean.head()
```

```
Out[10]:
```

	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

```

### 1.2.3 Issue #3: rating: Creating new Rating Column with Numerator & Denominator

**Define** Creating new Rating Column in Tweet Archives with both Numerator and Denominator.

#### Code

```

In [11]: rating = archives_clean.text.str.extract('(\d+(\.\d+)*\/\d+)')
         archives_clean['rating'] = rating[0]

```

#### Test

```

In [12]: archives_clean.head()

```

```

Out[12]:
           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 rating
0                10  Phineas  None    None    None    None  13/10
1                10   Tilly  None    None    None    None  13/10
2                10  Archie  None    None    None    None  12/10
3                10   Darla  None    None    None    None  13/10
4                10 Franklin  None    None    None    None  12/10

```

#### 1.2.4 Issue #4: rating\_numerator, rating\_denominator: Missing Column (Fraction)

**Define** Create a new column for Fraction that includes (rating\_numerator and rating\_denominator).

##### Code

```
In [13]: archives_clean['fraction'] = archives_clean['rating_numerator'].astype(float)/archives_clean['rating_denominator']
```

##### Test

```
In [14]: archives_clean['fraction'].value_counts()
```

```
Out[14]: 1.200000    503
         1.000000    443
         1.100000    431
```

1.300000	307
0.900000	156
0.800000	98
0.700000	53
1.400000	43
0.500000	37
0.600000	32
0.300000	19
0.400000	15
0.200000	11
0.100000	7
42.000000	2
0.000000	2
0.818182	1
1.250000	1
66.600000	1
1.500000	1
inf	1
7.500000	1
177.600000	1
2.600000	1
3.428571	1
0.636364	1
1.700000	1
0.733333	1
2.700000	1
18.200000	1

Name: fraction, dtype: int64

### 1.2.5 Issue #5: name('None', 'a', 'an'): Invalid Names, Less than three characters

**Define** Handling invalid names ('None', 'a', 'an') and replacing them with 'None'

#### Code

```
In [15]: dognames = ['None', 'a', 'the', 'an', 'this', 'such', 'quite', 'not', 'one', 'incredibl

for word in dognames:
    archives_clean.loc[archives_clean.name == word, 'name'] = None
```

#### Test

```
In [16]: archives_clean['name'].value_counts()
```

```
Out[16]: Lucy      11
         Charlie   11
         Oliver    10
         Cooper    10
```

```

Tucker      9
..
Monkey      1
Tobi        1
Marvin      1
Yoda        1
Grady       1
Name: name, Length: 942, dtype: int64

```

### 1.2.6 Issue #6: source: Removing HTTP Code in Source Column

**Define** Removing HTTP Code from Source Column in Tweet Archives using regular expressions.

#### Code

```

In [17]: archives_clean['source'] = archives_clean['source'].str.extract('(<a href="https?")(:\//\
archives_clean['source'] = archives_clean['source'].astype('category')

```

#### Test

```

In [18]: archives_clean.source.value_counts()

```

```

Out[18]: Twitter for iPhone      2041
Vine - Make a Scene             90
Twitter Web Client              31
TweetDeck                      11
Name: source, dtype: int64

```

### 1.2.7 Issue #7: in\_reply\_to\_status\_id, in\_reply\_to\_user\_id , timestamp: Have Erroneous Data Types

**Define** Converting in\_reply\_to\_status\_id and in\_reply\_to\_user\_id from float64 to int64 data type and timestamp from object to datetime data type.

#### Code

```

In [19]: archives_clean.in_reply_to_status_id = archives_clean.in_reply_to_status_id.fillna(0)
archives_clean.in_reply_to_user_id = archives_clean.in_reply_to_user_id.fillna(0)
archives_clean.in_reply_to_status_id = archives_clean.in_reply_to_status_id.astype(np.int64)
archives_clean.in_reply_to_user_id = archives_clean.in_reply_to_user_id.astype(np.int64)
archives_clean.timestamp = pd.to_datetime(archives_clean.timestamp)

```

#### Test

```

In [20]: archives_clean.dtypes

```

```

Out[20]: tweet_id                int64
         in_reply_to_status_id    int64
         in_reply_to_user_id      int64
         timestamp                datetime64[ns, UTC]
         source                   category
         text                     object
         retweeted_status_id       float64
         retweeted_status_user_id  float64
         retweeted_status_timestamp object
         expanded_urls            object
         rating_numerator          int64
         rating_denominator        int64
         name                     object
         doggo                    object
         floofer                  object
         pupper                   object
         puppo                    object
         rating                   object
         fraction                  float64
         dtype: object

```

### 1.2.8 Issue #8: tweet\_id: Missing Tweets across Archives and Predictions

**Define** Keep only those tweets in Twitter Archives Dataframe whose IDs exist in Twitter Predictions.

#### Code

```
In [21]: archives_clean = archives_clean[archives_clean.tweet_id.isin(predictions_clean.tweet_id)]
```

#### Test

```
In [22]: len(archives_clean[~archives_clean.tweet_id.isin(predictions_clean.tweet_id)])
```

```
Out[22]: 0
```

## Tidiness Issues Untidy Data (Structural Issues)

1. Drop any unnecessary columns from the Twitter Archives Dataframe.
2. Combining Dog Stages (Floofer/Pupper/Puppo/Doggo) into single column.
3. Join the Twitter API and Twitter Predictions datasets to Twitter Archives.

### 1.2.9 Issue-1: Drop any unnecessary columns from the Twitter Archives Dataframe

**Define** Dropping few unnecessary columns in the Twitter Archives that aren't required for analysis.

#### Code

```
In [23]: archives_clean.drop(['in_reply_to_status_id', 'in_reply_to_user_id', 'retweeted_status_
```



## Test

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

```
<class 'pandas.core.frame.DataFrame'>
```

```
Int64Index: 1993 entries, 0 to 2355
```

```
Data columns (total 14 columns):
```

#	Column	Non-Null Count	Dtype
0	tweet_id	1993 non-null	int64
1	timestamp	1993 non-null	datetime64[ns, UTC]
2	source	1993 non-null	category
3	text	1993 non-null	object
4	expanded_urls	1993 non-null	object
5	rating_numerator	1993 non-null	int64
6	rating_denominator	1993 non-null	int64
7	name	1361 non-null	object
8	doggo	1993 non-null	object
9	floofer	1993 non-null	object
10	pupper	1993 non-null	object
11	puppo	1993 non-null	object
12	rating	1993 non-null	object
13	fraction	1993 non-null	float64

```
dtypes: category(1), datetime64[ns, UTC](1), float64(1), int64(3), object(8)
```

```
memory usage: 220.1+ KB
```

### 1.2.10 Issue-2: Combining Dog Stages (Floofer/Pupper/Puppo/Doggo) into single column.

**Define** Combining the various dog stages like Doggo/Floofer/Pupper/Puppo in a single column.

## Code

```
In [25]: archives_clean['dog_stages'] = archives_clean.text.str.extract('(doggo|floofer|pupper|puppo)')
         archives_clean.drop(['doggo', 'floofer', 'pupper', 'puppo'], axis=1, inplace = True)
```

## Test

```
In [83]: archives_clean.sample(5)
```

```
Out[83]:
```

	tweet_id	timestamp	source	text
1555	688894073864884227	2016-01-18 01:22:00+00:00	Twitter for iPhone	
2352	666044226329800704	2015-11-16 00:04:52+00:00	Twitter for iPhone	
639	793256262322548741	2016-11-01 01:00:05+00:00	Twitter for iPhone	
1468	694206574471057408	2016-02-01 17:11:59+00:00	Twitter for iPhone	
2029	671855973984772097	2015-12-02 00:58:41+00:00	Twitter for iPhone	

```

1555 This is Hamrick. He's covered in corn flakes. ...
2352 This is a purebred Piers Morgan. Loves to Netf...
639 Oh h*ck look at this spookling right here. Fri...
1468 "Martha come take a look at this. I'm so fed u...
2029 Remarkable dog here. Walks on back legs really...

```

```

                                expanded_urls  rating_numerator \
1555 https://twitter.com/dog_rates/status/688894073...          7
2352 https://twitter.com/dog_rates/status/666044226...          6
639  https://twitter.com/dog_rates/status/793256262...         12
1468 https://twitter.com/dog_rates/status/694206574...         10
2029 https://twitter.com/dog_rates/status/671855973...          8

```

```

        rating_denominator  name rating  fraction dog_stages
1555                10  Hamrick   7/10      0.7      pupper
2352                10    None   6/10      0.6         NaN
639                 10    None  12/10      1.2         NaN
1468                10    None  10/10      1.0         NaN
2029                10    None   8/10      0.8         NaN

```

### 1.2.11 Issue-3: Join the Twitter API and Twitter Predictions datasets to Twitter Archives.

**Define** Merging the archives\_clean, predictions\_clean and api\_clean dataframes using pd.merge() function.

#### Code

```

In [26]: # Merging the Twitter Archives with Twitter Predictions
        combine_df = pd.merge(archives_clean, predictions_clean, how = 'inner', on = ['tweet_id', 'text'])

        # Merging Combined Dataframe with Twitter API
        combine_df = pd.merge(combine_df, api_clean, how = 'inner', on = ['tweet_id']).copy()

```

#### Test

```

In [27]: combine_df.head()

```

```

Out[27]:
   tweet_id  timestamp  source \
0  892420643555336193  2017-08-01 16:23:56+00:00  Twitter for iPhone
1  892177421306343426  2017-08-01 00:17:27+00:00  Twitter for iPhone
2  891815181378084864  2017-07-31 00:18:03+00:00  Twitter for iPhone
3  891689557279858688  2017-07-30 15:58:51+00:00  Twitter for iPhone
4  891327558926688256  2017-07-29 16:00:24+00:00  Twitter for iPhone

   text \
0  This is Phineas. He's a mystical boy. Only eve...
1  This is Tilly. She's just checking pup on you...
2  This is Archie. He is a rare Norwegian Pouncin...

```

```

3 This is Darla. She commenced a snooze mid meal...
4 This is Franklin. He would like you to stop ca...

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

rating_denominator  name rating  fraction  ...  p1_conf p1_dog \
0                10  Phineas 13/10      1.3  ...  0.097049 False
1                10   Tilly 13/10      1.3  ...  0.323581  True
2                10  Archie 12/10      1.2  ...  0.716012  True
3                10   Darla 13/10      1.3  ...  0.170278 False
4                10 Franklin 12/10      1.2  ...  0.555712  True

                                p2  p2_conf  p2_dog                                p3 \
0                bagel  0.085851  False                                banana
1                Pekinese 0.090647  True                                papillon
2                malamute 0.078253  True                                kelpie
3  Labrador_retriever 0.168086  True                                spatula
4   English_springer 0.225770  True  German_short-haired_pointer

p3_conf  p3_dog  favorites  retweets
0  0.076110  False      36331      7729
1  0.068957   True      31306      5725
2  0.031379   True      23585      3787
3  0.040836  False      39627      7887
4  0.175219   True      37820      8515

[5 rows x 24 columns]

```

## 1.3 Save the Cleaned Data

### 1.3.1 Creating the Master Dataset for Visualisation and Insights

```
In [149]: combine_df.to_csv('twitter_archive_master.csv', index=False)
```

## Visualising Data

### 1.3.2 Reading data from master dataset into individual data frame

```
In [150]: tweets = pd.read_csv('twitter_archive_master.csv')
```

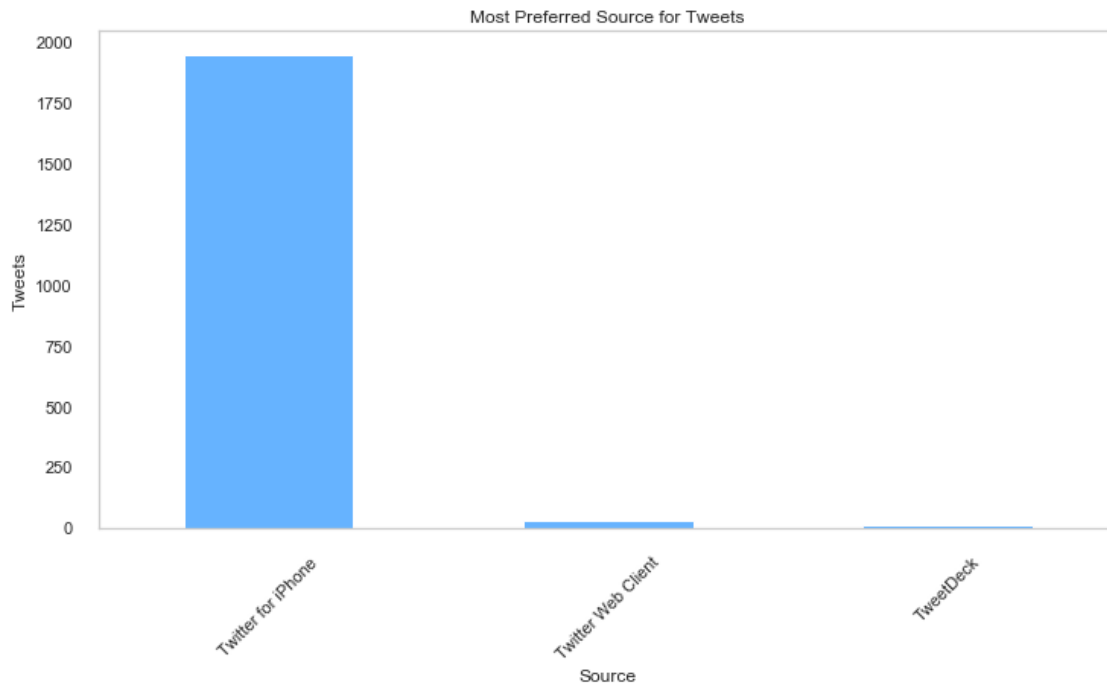
### Insight-1 and Visualisation: Which is the most preferred source for tweeting?

```
In [204]: fig, ax = plt.subplots(figsize = (12,6))
          sns.set_style("whitegrid")
```

```

my_palette = ['#66b3ff', '#00cc99', '#ff6666', '#ffff66', '#8c66ff', '#66ffd9']
sns.color_palette(my_palette)
tweets.source.value_counts().plot.bar()
plt.xticks(rotation=45)
plt.xlabel('Source')
plt.ylabel('Tweets')
plt.title('Most Preferred Source for Tweets')
plt.grid(b=None)
plt.show()

```



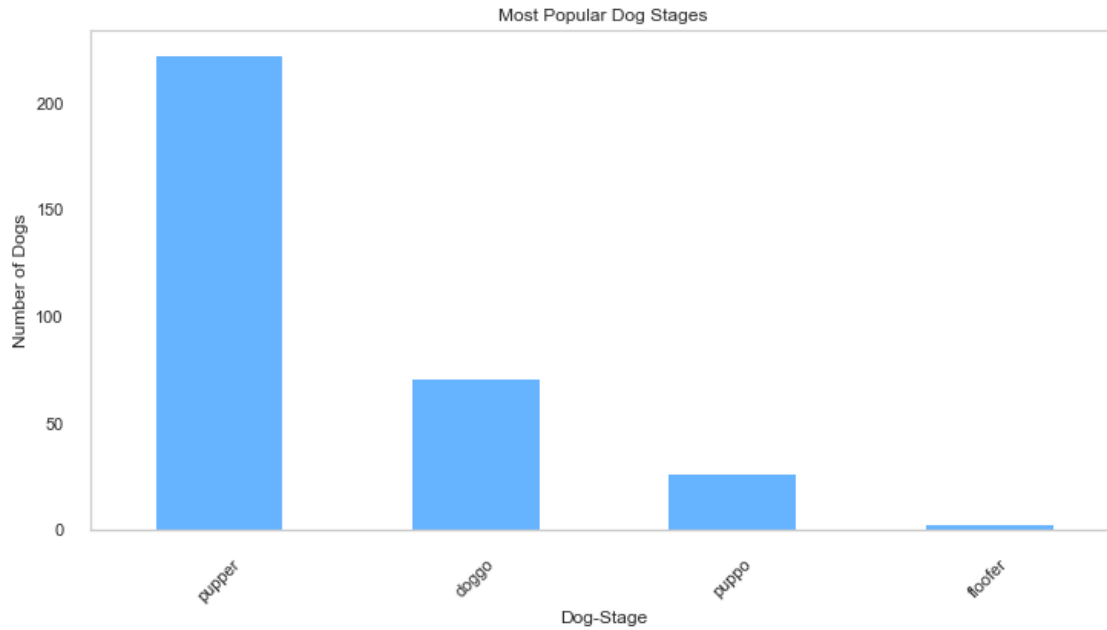
Twitter for iPhone is most preferred source.

### Insight-2 and Visualisation: What are the most popular dog stages?

```

In [199]: fig, ax = plt.subplots(figsize = (12,6))
sns.set_style("whitegrid")
my_palette = ['#66b3ff', '#00cc99', '#ff6666', '#ffff66', '#8c66ff', '#66ffd9']
sns.color_palette(my_palette)
tweets.dog_stages.value_counts().sort_values(ascending=False).plot.bar()
plt.xlabel('Dog-Stage')
plt.xticks(rotation=45)
plt.ylabel('Number of Dogs')
plt.title('Most Popular Dog Stages')
plt.grid(b=None)
plt.show()

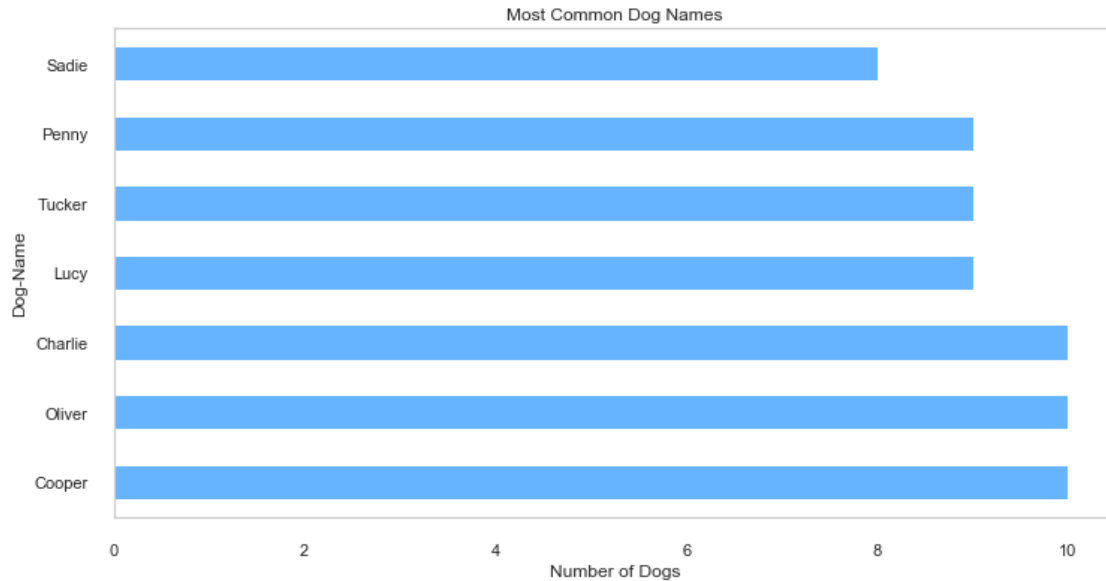
```



Pupper is most popular, followed by doggo.

### Insight-3 and Visualisation: What are the most common dog names?

```
In [200]: fig, ax = plt.subplots(figsize = (12,6))
sns.set_style("whitegrid")
my_palette = ['#66b3ff', '#00cc99', '#ff6666', '#ffff66', '#8c66ff', '#66ffd9']
sns.color_palette(my_palette)
tweets.name.value_counts()[0:7].sort_values(ascending=False).plot(kind='barh')
plt.xlabel('Number of Dogs')
plt.ylabel('Dog-Name')
plt.title('Most Common Dog Names')
plt.grid(b=None)
plt.show()
```



Cooper, Oliver, Charlie are common dog names among pet lovers.

## References

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2. Tweepy Library for Beginners (<https://towardsdatascience.com/tweepy-for-beginners-24baf21f2c25>)
3. Handling JSON Data in Python (<https://medium.com/swlh/handle-json-data-using-json-and-pandas-in-python-9ff6bbd0d356>)
4. Data Preparation using Pandas (<https://www.datacamp.com/community/tutorials/data-preparation-with-pandas>)
5. Data Handling using Pandas (<https://towardsdatascience.com/data-handling-using-pandas-cleaning-and-processing-3aa657dc9418>)
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