Brewery

March 21, 2024

1 Breweries in the United States

Source: Open Brewery Database Public API

References: * freecodecamp.com * stackoverflow.com

Data initially scrapped in 2018. Data is updated via Github dataset repository

[201]:

```python
import requests
import pandas as pd
import numpy as np
import datetime
import json
import matplotlib.pyplot as plt
import seaborn as sns
```

1.1 Load JSON file with data extracted from Public API

[203]:

```python
# retrieve JSON data from the file
with open("brewery_data.json", "r") as file:
    brewery_js = json.load(file)
```

[204]:

```python
# rows and columns

df.shape
```

[204]:

```
(8247, 16)
```

[205]:

```python
# Convert data from JSON to DataFrame
df = pd.DataFrame.from_dict(brewery_js, orient='columns')
df.head()
```

[205]:

```
                                     id                     name brewery_type  \
0  5128df48-79fc-4f0f-8b52-d06be54d0cec         (405) Brewing Co        micro
1  9c5a66c8-cc13-416f-a5d9-0a769c87d318         (512) Brewing Co        micro
2  34e8c68b-6146-453f-a4b9-1f6cd99a5ada  1 of Us Brewing Company        micro
3  ef970757-fe42-416f-931d-722451f1f59c      10 Barrel Brewing Co        large
4  6d14b220-8926-4521-8d19-b98a2d6ec3db      10 Barrel Brewing Co        large
```

```
               address_1 address_2 address_3            city state_province  \
0         1716 Topeka St      None      None          Norman       Oklahoma
1  407 Radam Ln Ste F200      None      None          Austin          Texas
2    8100 Washington Ave      None      None  Mount Pleasant      Wisconsin
3              1501 E St      None      None       San Diego     California
4          62970 18th St      None      None            Bend         Oregon

  postal_code        country           longitude            latitude  \
0  73069-8224  United States        -97.46818222         35.25738891
1  78745-1197  United States                None                None
2  53406-3920  United States  -87.88336350209435   42.72010826899558
3  92101-6618  United States         -117.129593           32.714813
4  97701-9847  United States         -121.281706         44.08683531

        phone                   website_url       state                 street
0  4058160490     http://www.405brewing.com    Oklahoma         1716 Topeka St
1  5129211545     http://www.512brewing.com       Texas  407 Radam Ln Ste F200
2  2624847553  https://www.1ofusbrewing.com   Wisconsin    8100 Washington Ave
3  6195782311           http://10barrel.com  California              1501 E St
4  5415851007       http://www.10barrel.com      Oregon          62970 18th St
```

[206]:

```
# information on columns and non-null count

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8247 entries, 0 to 8246
Data columns (total 16 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   id              8247 non-null   object
 1   name            8247 non-null   object
 2   brewery_type    8247 non-null   object
 3   address_1       7479 non-null   object
 4   address_2       94 non-null     object
 5   address_3       26 non-null     object
 6   city            8247 non-null   object
 7   state_province  8247 non-null   object
 8   postal_code     8247 non-null   object
 9   country         8247 non-null   object
 10  longitude       5920 non-null   object
 11  latitude        5920 non-null   object
 12  phone           7407 non-null   object
 13  website_url     7068 non-null   object
 14  state           8247 non-null   object
 15  street          7479 non-null   object
dtypes: object(16)
```

```
memory usage: 1.0+ MB
```

[207]:

```
# unique values

df.nunique()
```

[207]:

```
id                  8247
name                8102
brewery_type          11
address_1           7378
address_2             92
address_3             25
city                3101
state_province       116
postal_code         7992
country               12
longitude           5801
latitude            5801
phone               7213
website_url         6715
state                116
street              7378
dtype: int64
```

1.2 Data Preparation

[209]:

```
# What are the figures for unique value for breweries in the United States

df[df['country'] == 'United States'].nunique()
```

[209]:

```
id                  7970
name                7825
brewery_type          11
address_1           7111
address_2              4
address_3              0
city                2917
state_province        54
postal_code         7725
country                1
longitude           5535
latitude            5535
phone               6988
website_url         6485
state                 54
street              7111
dtype: int64
```

[210]:
```
# Create a dataframe for US breweries

df_us = df[df['country'] == 'United States'].copy()
df_us.head()
```

[210]:
```
                                     id                     name brewery_type  \
0  5128df48-79fc-4f0f-8b52-d06be54d0cec         (405) Brewing Co        micro
1  9c5a66c8-cc13-416f-a5d9-0a769c87d318         (512) Brewing Co        micro
2  34e8c68b-6146-453f-a4b9-1f6cd99a5ada  1 of Us Brewing Company        micro
3  ef970757-fe42-416f-931d-722451f1f59c     10 Barrel Brewing Co        large
4  6d14b220-8926-4521-8d19-b98a2d6ec3db     10 Barrel Brewing Co        large

               address_1 address_2 address_3            city state_province  \
0         1716 Topeka St      None      None          Norman       Oklahoma
1  407 Radam Ln Ste F200      None      None          Austin          Texas
2    8100 Washington Ave      None      None  Mount Pleasant      Wisconsin
3              1501 E St      None      None       San Diego     California
4          62970 18th St      None      None            Bend         Oregon

  postal_code        country           longitude           latitude  \
0  73069-8224  United States        -97.46818222        35.25738891
1  78745-1197  United States                None               None
2  53406-3920  United States  -87.88336350209435  42.72010826899558
3  92101-6618  United States         -117.129593          32.714813
4  97701-9847  United States         -121.281706        44.08683531

        phone                   website_url       state                 street
0  4058160490     http://www.405brewing.com    Oklahoma         1716 Topeka St
1  5129211545     http://www.512brewing.com       Texas  407 Radam Ln Ste F200
2  2624847553  https://www.1ofusbrewing.com   Wisconsin    8100 Washington Ave
3  6195782311           http://10barrel.com  California              1501 E St
4  5415851007       http://www.10barrel.com      Oregon          62970 18th St
```

[211]:
```
# Dimensions for the US dataframe
df_us.shape
```

[211]:
```
(7970, 16)
```

[212]:
```
# information on columns and non-null count
df_us.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 7970 entries, 0 to 8188
Data columns (total 16 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   id              7970 non-null   object
 1   name            7970 non-null   object
 2   brewery_type    7970 non-null   object
 3   address_1       7202 non-null   object
 4   address_2       4 non-null      object
 5   address_3       0 non-null      object
 6   city            7970 non-null   object
 7   state_province  7970 non-null   object
 8   postal_code     7970 non-null   object
 9   country         7970 non-null   object
 10  longitude       5645 non-null   object
 11  latitude        5645 non-null   object
 12  phone           7180 non-null   object
 13  website_url     6838 non-null   object
 14  state           7970 non-null   object
 15  street          7202 non-null   object
dtypes: object(16)
memory usage: 1.0+ MB
```

[213]:

```
# Drop Address_3 column since there are no non-null values

df_us.drop(['address_3'], axis=1, inplace=True)
df_us.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 7970 entries, 0 to 8188
Data columns (total 15 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   id              7970 non-null   object
 1   name            7970 non-null   object
 2   brewery_type    7970 non-null   object
 3   address_1       7202 non-null   object
 4   address_2       4 non-null      object
 5   city            7970 non-null   object
 6   state_province  7970 non-null   object
 7   postal_code     7970 non-null   object
 8   country         7970 non-null   object
 9   longitude       5645 non-null   object
 10  latitude        5645 non-null   object
 11  phone           7180 non-null   object
 12  website_url     6838 non-null   object
 13  state           7970 non-null   object
 14  street          7202 non-null   object
dtypes: object(15)
memory usage: 996.2+ KB
```

[214]:

```python
# Unique values for each column
df_us.nunique()
```

[214]:

```
id                7970
name              7825
brewery_type        11
address_1         7111
address_2            4
city              2917
state_province      54
postal_code       7725
country              1
longitude         5535
latitude          5535
phone             6988
website_url       6485
state               54
street            7111
dtype: int64
```

[215]:

```python
# There are more unique values for states than there are states
# Look at unique values for state
df_us.groupby(['state_province'])['id'].nunique()
```

[215]:

```
state_province
 Utah                     1
Alabama                  45
Alaska                   51
Arizona                 124
Arkansas                 45
California              912
Colorado                431
Connecticut              94
Delaware                 28
District of Columbia     16
Florida                 312
Georgia                 100
Hawaii                   23
Idaho                    67
Illinois                254
Indiana                 162
Iowa                     91
Kansas                   47
Kentucky                 58
Louisiana                43
MIssouri                  1
Maine                   114
```

```
Maryland                109
Massachusetts           163
Michigan                375
Minnesota               182
Mississippi              16
Missouri                141
Montana                  92
Nebraska                 57
Nevada                   51
New Hampshire            76
New Jersey              115
New Mexico               83
New York                418
North Carolina          307
North Dakota             26
Ohio                    303
Oklahoma                 44
Oregon                  295
Pennsylvania            345
Rhode Island             31
South Carolina           79
South Dakota             45
Tennessee               110
Texas                   351
Utah                     44
Vermont                  59
Virginia                254
Washington              471
Washington                1
West Virginia            40
Wisconsin               225
Wyoming                  43
Name: id, dtype: int64
```

Several states have misspelled names which is causing the unique values for states to be 54 instead of 50. Also, District of Columbia is included therefore the correct value should be 51.

[217]:

```
# convert state and state_province from object to string

df_us['state'] = df_us['state'].astype('string')
df_us['state_province'] = df_us['state_province'].astype('string')
df_us.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 7970 entries, 0 to 8188
Data columns (total 15 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
```

```
 0   id              7970 non-null   object
 1   name            7970 non-null   object
 2   brewery_type    7970 non-null   object
 3   address_1       7202 non-null   object
 4   address_2       4 non-null      object
 5   city            7970 non-null   object
 6   state_province  7970 non-null   string
 7   postal_code     7970 non-null   object
 8   country         7970 non-null   object
 9   longitude       5645 non-null   object
 10  latitude        5645 non-null   object
 11  phone           7180 non-null   object
 12  website_url     6838 non-null   object
 13  state           7970 non-null   string
 14  street          7202 non-null   object
dtypes: object(13), string(2)
memory usage: 996.2+ KB
```

[218]:

```
# State_province. Replace misspelled state names

df_us['state_province'] = df_us['state_province'].replace(" Utah","Utah")
df_us['state_province'] = df_us['state_province'].replace("MIssouri","Missouri")
df_us['state_province'] = df_us['state_province'].replace("Washington␣
 ↪","Washington")
```

[219]:

```
# State.  Replace misspelled state names

df_us['state'] = df_us['state'].replace(" Utah","Utah")
df_us['state'] = df_us['state'].replace("MIssouri","Missouri")
df_us['state'] = df_us['state'].replace("Washington ","Washington")
```

[220]:

```
# Confirm update
df_us.nunique()
```

[220]:

```
id                7970
name              7825
brewery_type        11
address_1         7111
address_2            4
city              2917
state_province      51
postal_code       7725
country              1
longitude         5535
latitude          5535
phone             6988
website_url       6485
```

```
state                  51
street               7111
dtype: int64
```

[221]:

```
# Look at state and state_province
df_us.groupby(['state_province', 'state'])['id'].nunique()
```

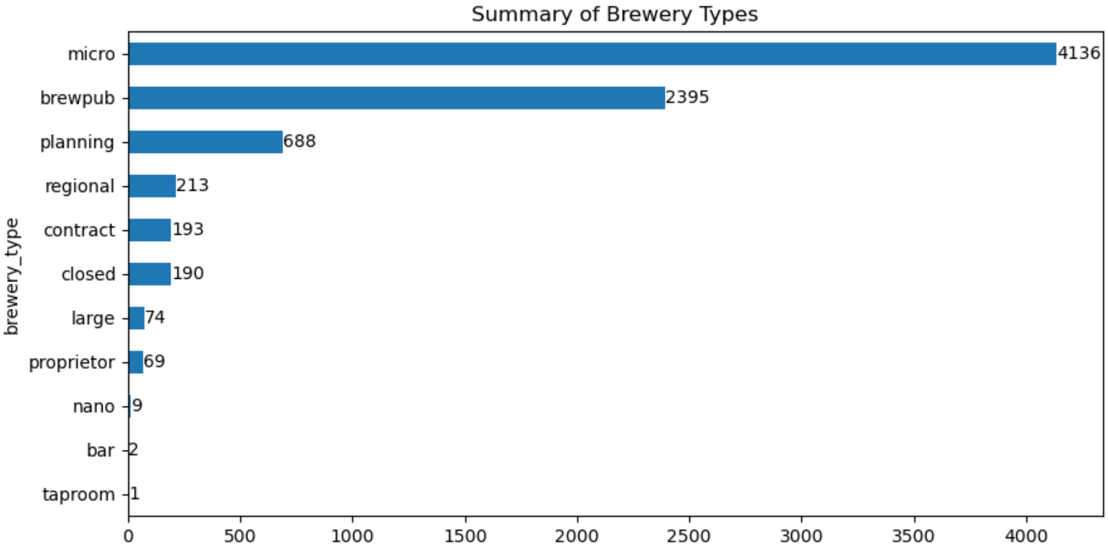
[221]:

```
state_province        state
Alabama               Alabama                  45
Alaska                Alaska                   51
Arizona               Arizona                 124
Arkansas              Arkansas                 45
California            California              912
Colorado              Colorado                431
Connecticut           Connecticut              94
Delaware              Delaware                 28
District of Columbia  District of Columbia     16
Florida               Florida                 312
Georgia               Georgia                 100
Hawaii                Hawaii                   23
Idaho                 Idaho                    67
Illinois              Illinois                254
Indiana               Indiana                 162
Iowa                  Iowa                     91
Kansas                Kansas                   47
Kentucky              Kentucky                 58
Louisiana             Louisiana                43
Maine                 Maine                   114
Maryland              Maryland                109
Massachusetts         Massachusetts           163
Michigan              Michigan                375
Minnesota             Minnesota               182
Mississippi           Mississippi              16
Missouri              Missouri                142
Montana               Montana                  92
Nebraska              Nebraska                 57
Nevada                Nevada                   51
New Hampshire         New Hampshire            76
New Jersey            New Jersey              115
New Mexico            New Mexico               83
New York              New York                418
North Carolina        North Carolina          307
North Dakota          North Dakota             26
Ohio                  Ohio                    303
Oklahoma              Oklahoma                 44
Oregon                Oregon                  295
Pennsylvania          Pennsylvania            345
```

```
Rhode Island          Rhode Island          31
South Carolina        South Carolina        79
South Dakota          South Dakota          45
Tennessee             Tennessee            110
Texas                 Texas                351
Utah                  Utah                  45
Vermont               Vermont               59
Virginia              Virginia             254
Washington            Washington           472
West Virginia         West Virginia         40
Wisconsin             Wisconsin            225
Wyoming               Wyoming               43
Name: id, dtype: int64
```

[222]:

```
# Brewery Types

ax = df_us.brewery_type.value_counts().sort_values(ascending=True).
 ↪plot(kind='barh', figsize=(10,5), title="Summary of Brewery Types")
ax.bar_label(ax.containers[0])
plt.show()
```

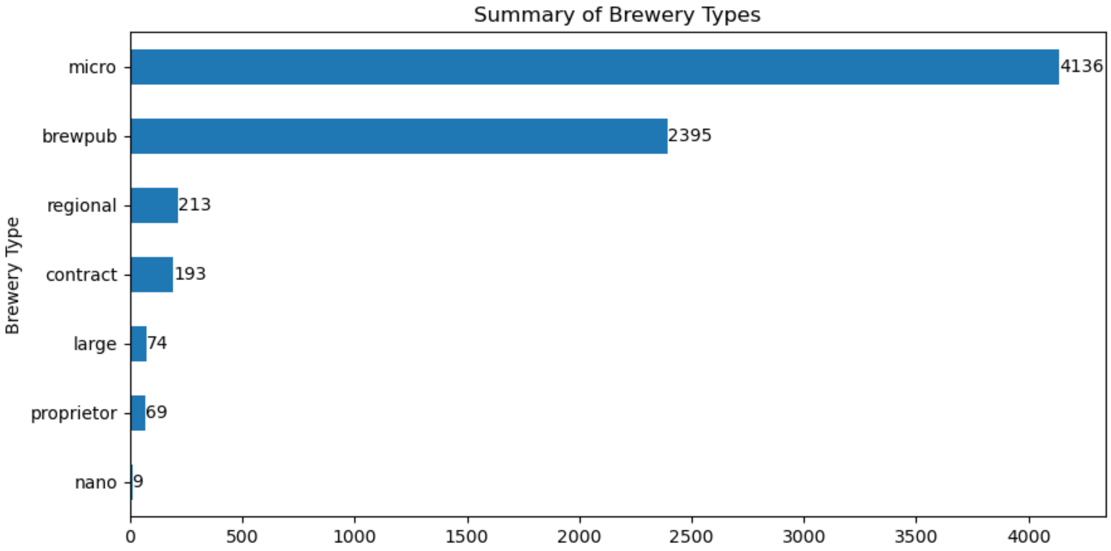


[223]:

```
# Closed:  A location which has been closed
# Planning: A brewery in planning not yet opened to the public
# Bar:  A bar. O brewery equipment on premise
# Taproom:  A place with a brewery serves beer

# Remove brewery_types that do not represent an open brewery
# Drops  881 rows.
```

```
df_us = df_us[~df_us['brewery_type'].
 ↪isin(['closed','planning','bar','taproom'])]
```

[224]:
```
# Brewery types after update
ax = df_us.brewery_type.value_counts().sort_values(ascending=True).
 ↪plot(kind='barh', figsize=(10,5), title="Summary of Brewery Types")
ax.bar_label(ax.containers[0])
ax.set_ylabel('Brewery Type')
plt.show()
```



1.3 Exploratory Data Analysis

[226]:
```
# Total Breweries in the US

df_us['id'].value_counts().sum()
```

[226]:
```
7089
```

[227]:
```
# Fields with  missing values
df_us.isnull().sum()
```

[227]:
```
id                 0
name               0
brewery_type       0
address_1         78
address_2       7085
city               0
```

```
state_province       0
postal_code          0
country              0
longitude         1701
latitude          1701
phone              544
website_url        781
state                0
street              78
dtype: int64
```

[228]:

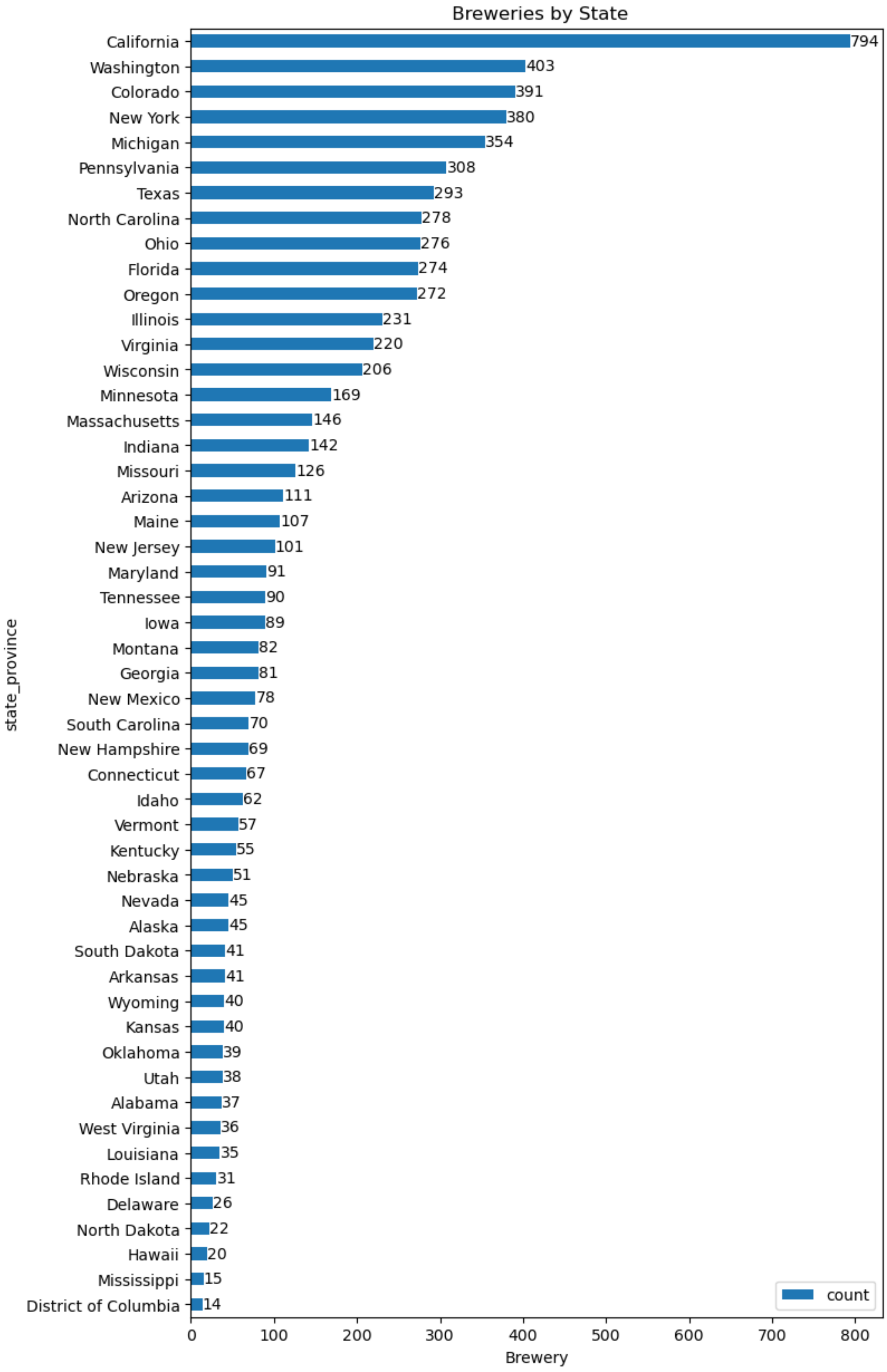
```
# Percentage of breweries that have website url information

(df_us['website_url'].value_counts().sum())/(df_us['id'].value_counts().sum())
```

[228]:

```
0.8898293130201721
```

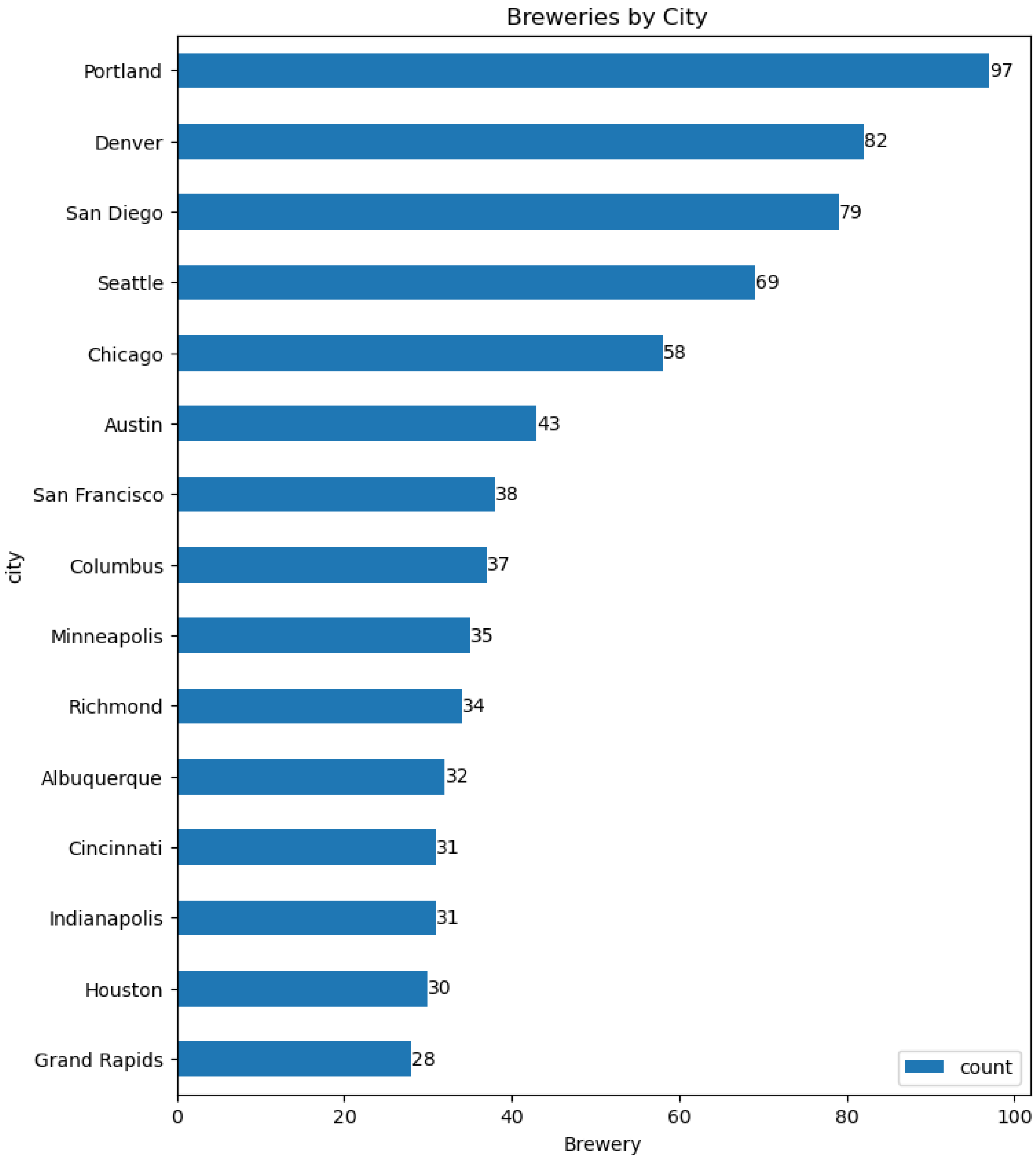
[229]:

```
# Breweries by State

ax=df_us.groupby('state_province')['brewery_type']\
         .agg(['count'])\
         .sort_values('count',ascending=True) \
         .plot(kind='barh', figsize=(8,15), title = ' Breweries by State')
ax.set_xlabel('Brewery')
ax.bar_label(ax.containers[0])
plt.show()
```


Breweries by State
California 794
Washington 403
Colorado 391
New York 380
Michigan 354
Pennsylvania 308
Texas 293
North Carolina 278
Ohio 276
Florida 274
Oregon 272
Illinois 231
Virginia 220
Wisconsin 206
Minnesota 169
Massachusetts 146
Indiana 142
Missouri 126
Arizona 111
Maine 107
New Jersey 101
Maryland 91
Tennessee 90
Iowa 89
Montana 82
Georgia 81
New Mexico 78
South Carolina 70
New Hampshire 69
Connecticut 67
Idaho 62
Vermont 57
Kentucky 55
Nebraska 51
Nevada 45
Alaska 45
South Dakota 41
Arkansas 41
Wyoming 40
Kansas 40
Oklahoma 39
Utah 38
Alabama 37
West Virginia 36
Louisiana 35
Rhode Island 31
Delaware 26
North Dakota 22
Hawaii 20
Mississippi 15
District of Columbia 14
state_province
0
100
200
300
400
500
600
700
800
Brewery
count

[230]:

```
# Breweries by City (Top 20 by number of breweries)

ax=df_us.groupby('city')['brewery_type']\
         .agg(['count'])\
         .sort_values('count',ascending=True) \
         .tail(15) \
         .plot(kind='barh', figsize=(8,10), title = ' Breweries by City')
ax.set_xlabel('Brewery')
ax.bar_label(ax.containers[0])
plt.show()
```



[231]:

```
# Average length of Brewery name

df_us['name'].astype(str).map(len).mean()
```

[231]:

```
22.881506559458316
```

[232]:

```
# Most common brewery names
```

```
brewname = df_us.groupby(df_us['name'].str.slice(0,23))['id'].agg(['count']).
  ↪sort_values('count', ascending=False)
brewname.head(5)
```

[232]:

```
                         count
name
Granite City Food & Bre     32
Gordon Biersch Brewery      21
Iron Hill Brewery & Res     14
RAM Restaurant and Brew     12
Karl Strauss Brewing Co     11
```

[233]:

```
# Average length of website url

df_us['website_url'].astype(str).map(len).mean()
```

[233]:

```
26.89547185780787
```

[234]:

```
# Breweries associated with a website url

web = df_us.groupby(['website_url'])['id'].agg(['count']).sort_values('count',␣
  ↪ascending=False)
web.head()
```

[234]:

```
                                      count
website_url
http://www.gcfb.net                      23
http://www.rockbottom.com                21
http://www.craftworksrestaurants.com     19
http://www.mcmenamins.com                17
http://www.ironhillbrewery.com           14
```

[235]:

```
# 10 postal codes with the most breweries

brewpostal = df_us.groupby(df_us['postal_code'].str.slice(0,5))['id'].
  ↪agg(['count']).sort_values('count', ascending=False)
brewpostal.head(10)
```

[235]:

```
             count
postal_code
80301           15
28801           15
44113           15
98107           14
97214           14
92121           13
98402           12
```

```
29405          12
80205          12
98072          11
```

Zipcode 80301 belongs to Boulder Colorado. Zipcode 28801 belongs to Asheville, NC. Zipcode 44113 belongs to Cleveland, OH

1.4 Create a CSV file

[238]:

```
# Write cleaned df_us to csv
df_us.to_csv('US_Breweries.csv', index=False)
```

[ ]:

```

```