AlcoholConsumptionAnalysis2021

September 17, 2021

1 Exploratory Data Analysis: Alcohol Consumption Across the World

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Below, I imported two csv files to merge into one new dataframe: 1. `alcoholdata` dataframe containing **alcohol consumption across the world** 2. `countrycontinentmatch` dataframe **maps the country name to the continent**.

1.0.1 Data Overview

I wanted to see what types of data each dataframe comprises of using: - `df.head()` to view the first 5 rows of the dataframe -`df.dtypes` to view the types of data in each column

[2]:
```
alcoholdata=pd.read_csv('https://raw.githubusercontent.com/fivethirtyeight/data/
↪master/alcohol-consumption/drinks.csv')
alcoholdata.head()
```

[2]:
```
       country  beer_servings  spirit_servings  wine_servings  \
0  Afghanistan              0                0              0
1      Albania             89              132             54
2      Algeria             25                0             14
3      Andorra            245              138            312
4       Angola            217               57             45

   total_litres_of_pure_alcohol
0                           0.0
1                           4.9
2                           0.7
3                          12.4
4                           5.9
```

[3]:
```
alcoholdata.dtypes
```

[3]:
```
country                          object
beer_servings                     int64
spirit_servings                   int64
wine_servings                     int64
total_litres_of_pure_alcohol    float64
dtype: object
```

[4]:
```
countrycontinentmatch=pd.read_csv('https://pkgstore.datahub.io/JohnSnowLabs/
 ↪country-and-continent-codes-list/country-and-continent-codes-list-csv_csv/
 ↪data/b7876b7f496677669644f3d1069d3121/
 ↪country-and-continent-codes-list-csv_csv.csv')
countrycontinentmatch.head()
```

[4]:
```
  Continent_Name Continent_Code                                 Country_Name  \
0           Asia             AS            Afghanistan, Islamic Republic of
1         Europe             EU                         Albania, Republic of
2     Antarctica             AN  Antarctica (the territory South of 60 deg S)
3         Africa             AF      Algeria, People's Democratic Republic of
4        Oceania             OC                               American Samoa

  Two_Letter_Country_Code Three_Letter_Country_Code  Country_Number
0                      AF                       AFG             4.0
1                      AL                       ALB             8.0
2                      AQ                       ATA            10.0
3                      DZ                       DZA            12.0
4                      AS                       ASM            16.0
```

1.0.2 Data Manipulation: Extracting the country name

I only need the first word of the **Country_Name** column, thus I will use the split() method to return a list of all the words in the string, and extract the first word, followed by replacing the commas with a whitespace. - `str.split()`: This returns a list of lines - `str.split().str[x]`: This returns a xth value in the string - `str.replace(['old value'],'new value')`: This replaces values in a dataframe

[5]:
```
countrycontinentmatch.dtypes
```

[5]:
```
Continent_Name                object
Continent_Code                object
Country_Name                  object
Two_Letter_Country_Code       object
Three_Letter_Country_Code     object
Country_Number               float64
dtype: object
```

[6]:

```
#splitting the 'Country_Name' column into lines of lists and extracting the␣
↪first word with str[0]
countrycontinentmatch['Name']=countrycontinentmatch['Country_Name'].str.split('␣
↪').str[0]
countrycontinentmatch['Name']
```

```
[6]: 0      Afghanistan,
     1          Albania,
     2        Antarctica
     3          Algeria,
     4          American
                ...
     257          Zambia,
     258         Disputed
     259       Iraq-Saudi
     260           United
     261          Spratly
     Name: Name, Length: 262, dtype: object
```

```
[7]: #removing the commas from the name column
     countrycontinentmatch['Name']=countrycontinentmatch['Name'].str.replace(',','')
     countrycontinentmatch['Name']
```

```
[7]: 0      Afghanistan
     1          Albania
     2       Antarctica
     3          Algeria
     4         American
               ...
     257         Zambia
     258       Disputed
     259     Iraq-Saudi
     260         United
     261        Spratly
     Name: Name, Length: 262, dtype: object
```

```
[8]: countrycontinentmatch.head()
```

```
[8]:   Continent_Name Continent_Code                                  Country_Name  \
     0           Asia             AS              Afghanistan, Islamic Republic of
     1         Europe             EU                          Albania, Republic of
     2     Antarctica             AN  Antarctica (the territory South of 60 deg S)
     3         Africa             AF        Algeria, People's Democratic Republic of
     4        Oceania             OC                                American Samoa

       Two_Letter_Country_Code Three_Letter_Country_Code  Country_Number  \
     0                      AF                       AFG             4.0
```

```
1                       AL                        ALB              8.0
2                       AQ                        ATA             10.0
3                       DZ                        DZA             12.0
4                       AS                        ASM             16.0

          Name
0  Afghanistan
1      Albania
2   Antarctica
3      Algeria
4     American
```

1.0.3 Data Merging: Merging Two Datasets with a Common Column Name

Here, I want to classify the countries in the **alcoholdata** dataframe to match the continents in the **countrycontinentmatch** dataframe.

I am only interested in the continent name and country for the **countrycontinentmatch** dataframe, let's extract that into its own dataframe **countires**. In this new dataframe, it only consists of 2 columns: Continent, country. Note that I renamed the name to country to match the column name in the alcoholdata dataframe, so that I can leverage the merge function to automatically join using *country* as a common key. - `pd.merge()`: Automatically joins dataframes using a common key. If not we can use *left_on* or *right_on* keywords to specify the different column names.

The output of this is a new dataframe **newalcoholdata** with an additional column for *Continent*

[9]:
```
countries=countrycontinentmatch[['Continent_Name','Name']]
countries.rename(columns={'Continent_Name':'Continent','Name':
 ↪'country'},inplace=True)
countries
```

```
/opt/conda/envs/ADA522/lib/python3.8/site-packages/pandas/core/frame.py:4441:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  return super().rename(
```

[9]:
```
       Continent      country
0           Asia  Afghanistan
1         Europe      Albania
2     Antarctica   Antarctica
3         Africa      Algeria
4        Oceania     American
..           …            …
257       Africa       Zambia
```

```
258     Oceania     Disputed
259        Asia   Iraq-Saudi
260        Asia       United
261        Asia      Spratly

[262 rows x 2 columns]
```

[10]:
```
newalcoholdata=pd.merge(countries, alcoholdata)
newalcoholdata
```

[10]:
```
         Continent      country  beer_servings  spirit_servings  \
0             Asia  Afghanistan              0                0
1           Europe      Albania             89              132
2           Africa      Algeria             25                0
3           Europe      Andorra            245              138
4           Africa       Angola            217               57
..             …            …            …              …
159           Asia   Uzbekistan             25              101
160  South America    Venezuela            333              100
161        Oceania        Samoa            105               18
162           Asia        Yemen              6                0
163         Africa       Zambia             32               19

     wine_servings  total_litres_of_pure_alcohol
0                0                           0.0
1               54                           4.9
2               14                           0.7
3              312                          12.4
4               45                           5.9
..             …                           …
159              8                           2.4
160              3                           7.7
161             24                           2.6
162              0                           0.1
163              4                           2.5

[164 rows x 6 columns]
```

1.0.4 Data Cleaning: Removing duplicate countries from the dataframe

Given that we combined 2 different datasets, I want to make sure that there are no null values in the columns. I would do this using: - `df.isna().sum()`: Displays number of null values in each of the columns of the dataframe

What I can gather from this dataset is: - There are no null values so I will not need to remove any column / rows with null values. - There are 164 rows and 6 columns in this dataset - Within the continent column, there are 6 unique variable which are Asian, Europe, Africa, South America, Oceania, and North America. This poses a potential opportunity to use groupby to summarize our findings. - Within the country column, there are 156 unique values which means that there are 8 countries in the column that have duplicated values. - `df.duplicated(subset=['col'])`: Displays boolean (T/F) values of duplicate rows. Keep determines which duplicates to keep (first = first occurence is False default, last = last occufrence is False) - `df[df.duplicated(subset=['col'])]`: Displays dataframe of duplicate values - `df.drop_duplicates()`: If we want to keep the first occurences, put keep = first, else = last, False= drop all duplicates

```
[11]: newalcoholdata.shape
```

```
[11]: (164, 6)
```

```
[12]: newalcoholdata.isna().sum()
```

```
[12]: Continent                       0
      country                         0
      beer_servings                   0
      spirit_servings                 0
      wine_servings                   0
      total_litres_of_pure_alcohol    0
      dtype: int64
```

```
[13]: newalcoholdata['Continent'].nunique()
```

```
[13]: 6
```

```
[14]: newalcoholdata['Continent'].unique()
```

```
[14]: array(['Asia', 'Europe', 'Africa', 'South America', 'Oceania',
             'North America'], dtype=object)
```

```
[15]: newalcoholdata['country'].nunique()
```

```
[15]: 156
```

We see below that several Middle Eastern countries such as Azerbaijan, Armenia, Cyprus, Georgia, Kazakhstan, and Turkey show both Asia and Europe as the continent. This is because they span between Asian and Europe; they could be interpreted differently by people.

In order to keep the consistency, I will drop the second duplicate for all these values. I went with this decision based on the categorization of Netherlands since it is in Europe and not in North America. Now, we see that the new dataframe **newalcoholdata** has 156 rows and 6 columns, which is what we want. It has the same number of unique values in the 'country' column.

```
[16]: newalcoholdata[newalcoholdata.duplicated(subset=['country'], keep=False)]
```

```
[16]:          Continent      country  beer_servings  spirit_servings  \
      5           Europe   Azerbaijan             21               46
      6             Asia   Azerbaijan             21               46
```

```
13          Europe      Armenia              21                179
14            Asia      Armenia              21                179
35          Africa        Congo              76                  1
36          Africa        Congo              76                  1
39          Europe       Cyprus             192                154
40            Asia       Cyprus             192                154
53          Europe      Georgia              52                100
54            Asia      Georgia              52                100
77          Europe   Kazakhstan             124                246
78            Asia   Kazakhstan             124                246
107         Europe  Netherlands             251                 88
108  North America  Netherlands             251                 88
149         Europe       Turkey              51                 22
150           Asia       Turkey              51                 22

     wine_servings  total_litres_of_pure_alcohol
5                5                           1.3
6                5                           1.3
13              11                           3.8
14              11                           3.8
35               9                           1.7
36               9                           1.7
39             113                           8.2
40             113                           8.2
53             149                           5.4
54             149                           5.4
77              12                           6.8
78              12                           6.8
107            190                           9.4
108            190                           9.4
149              7                           1.4
150              7                           1.4
```

[17]:
```python
newalcoholdata.drop_duplicates(subset=['country'], keep='first', inplace=True)
newalcoholdata.shape
```

[17]:
```
(156, 6)
```

1.0.5 Data Grouping and Categorization: Retrieving summary statistics of the continents

Next, I wanted to analyze the difference in beer, spirit, and wine servings across the different continents and / or countries. I used the groupby function to segregate the data by continent and country. - `df.groupby(['col to group by'])[col to display].aggregate()`: This function allows us to split data into separate groups to better perform analysis

However, I noticed that the continent column, which had 6 unique variables (Asian, Europe, Africa, South America, Oceania, and North America) poses a potential opportunity to use pivot to summarize our findings. - `pd.pivot_table(df, index='col',values='col',aggfunc='x')`: This function allows us to summarize data of a larger table

[18]:
```
newalcoholdata.groupby(['Continent','country']).sum()
```

[18]:
```
                             beer_servings  spirit_servings  wine_servings  \
Continent     country
Africa        Algeria                   25                0             14
              Angola                   217               57             45
              Benin                     34                4             13
              Botswana                 173               35             35
              Burundi                   88                0              0
…                                        …                …              …
South America Paraguay                 213              117             74
              Peru                     163              160             21
              Suriname                 128              178              7
              Uruguay                  115               35            220
              Venezuela                333              100              3

                             total_litres_of_pure_alcohol
Continent     country
Africa        Algeria                                 0.7
              Angola                                  5.9
              Benin                                   1.1
              Botswana                                5.4
              Burundi                                 6.3
…                                                       …
South America Paraguay                                7.3
              Peru                                    6.1
              Suriname                                5.6
              Uruguay                                 6.6
              Venezuela                               7.7

[156 rows x 4 columns]
```

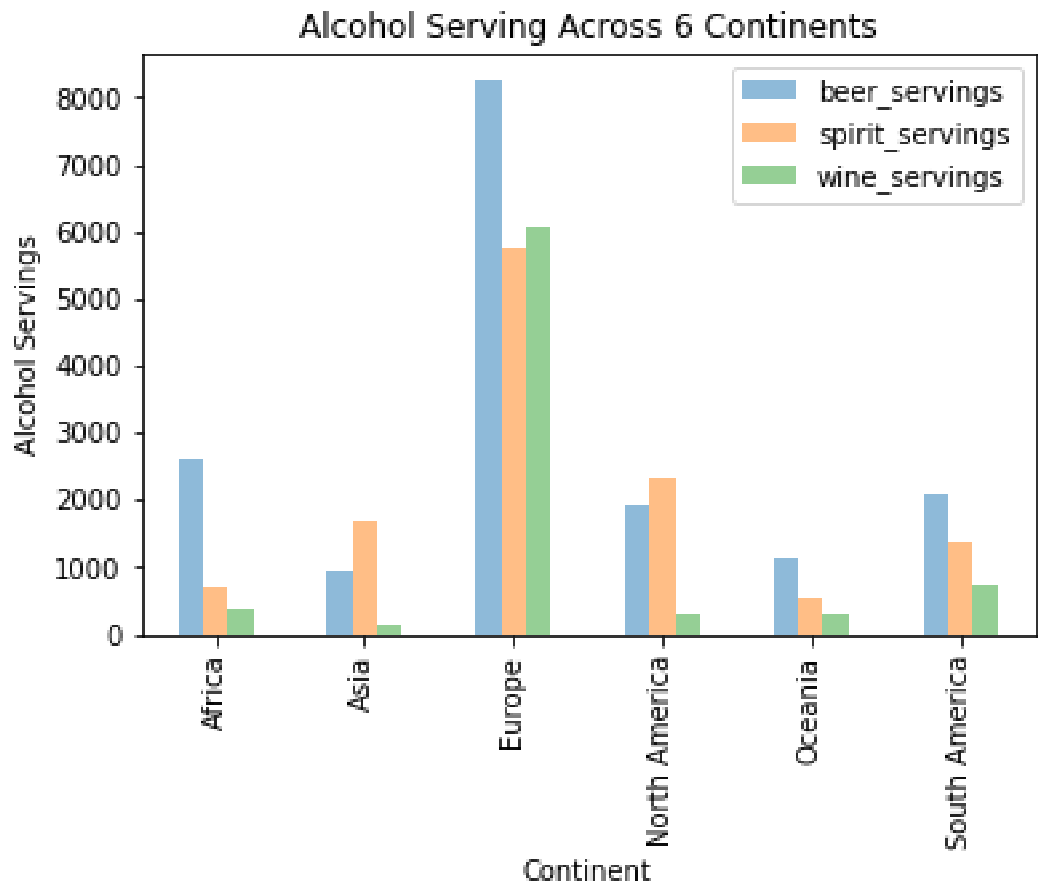
Findings #1: - As shown in the **grouped bar chart**, out of the 6 continents, Europe has the highest number of alcohol servings across all types (beer, spirit, wine). Since there is one column that uses litres as a measurement unit, while the other 3 columns use number of servings, I will exclude the liters column for this visualization. - As shown in the **pie chart**, I wanted to ensure that this finding is not skewed by larger number of countries within Europe, so I decided to calculate the number of countries categorized within each continent using `df.groupby` to see if that affects the alcohol servings across continents. It turns out that Europe and Africa continets have the largest number of countries, followed by Asia, North America, South America, and Oceania. This shows that there is no strong correlation between alcohol servings and number of countries within each continent. Although the number of countries in Europe and Africa continents are the same, Europe has a significantly higher alcohol servings than Asia.

```
[19]: df_pivot=pd.pivot_table(newalcoholdata,␣
       ↪index='Continent',values=['beer_servings','spirit_servings','wine_servings'],␣
       ↪aggfunc='sum')
      df_pivot
```

```
[19]:                beer_servings  spirit_servings  wine_servings
      Continent
      Africa                  2605              680            374
      Asia                     938             1691            148
      Europe                  8239             5764           6082
      North America           1918             2326            292
      Oceania                 1132              552            319
      South America           2101             1377            749
```

```
[20]: #Creatng a grouped bar chart using matplotlib
      ax=df_pivot.plot(kind="bar",alpha=0.5)
      plt.title('Alcohol Serving Across 6 Continents')
      plt.xlabel('Continent')
      plt.ylabel('Alcohol Servings')

      #Show plot
      plt.show()
```

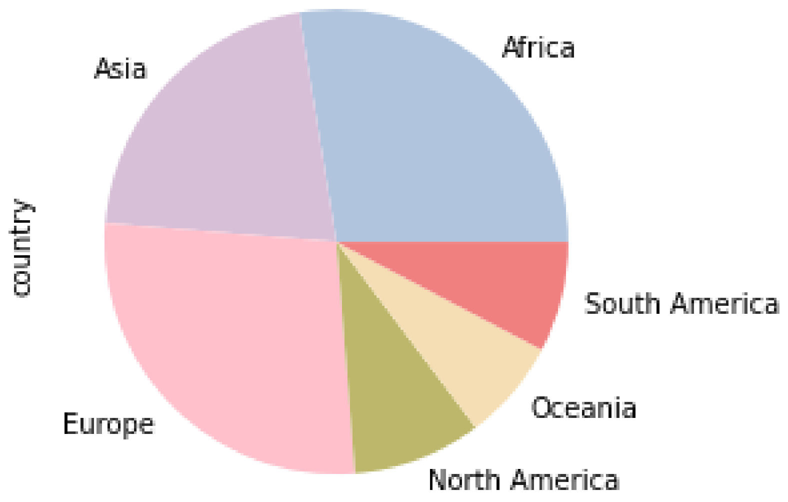


[21]:
```
groupedcontinent=newalcoholdata.groupby('Continent')['country'].count()
groupedcontinent
```

[21]:
```
Continent
Africa           43
Asia             33
Europe           43
North America    14
Oceania          11
South America    12
Name: country, dtype: int64
```

[22]:
```
colors = ['lightsteelblue', 'thistle', 'pink', 'darkkhaki',␣
 ↪'wheat','lightcoral']
groupedcontinent.plot.pie(colors=colors)
```

[22]:
```
<AxesSubplot:ylabel='country'>
```



Since we narrowed down that Europe has the largest alcohol consumption, I am interested in finding out which countries within Europe have the highest number of beer, spirit, and wine servings respectively.

- `df['col'].max()`: This shows us the max value
- `df['col']=`df['col'].max()`: This shows us true / false boolean values - `df[df['col']=`df['col'].max()]`: This returns the rows with the max column value -`pd.concat([df1,df2,df3])`: This concatenates the dataframes vertically. Concat, merge and join function similarly. The difference is that ***concat*** combines dataframes ***vertically***, whereas ***merge and join*** combines dataframes ***horizontally***.

[58]:
```
europedata=newalcoholdata[newalcoholdata['Continent']=='Europe']
europedata.head()
```

[58]:
```
   Continent     country  beer_servings  spirit_servings  wine_servings  \
1     Europe     Albania             89              132             54
3     Europe     Andorra            245              138            312
5     Europe  Azerbaijan             21               46              5
9     Europe     Austria            279               75            191
13    Europe     Armenia             21              179             11

    total_litres_of_pure_alcohol
1                            4.9
3                           12.4
5                            1.3
9                            9.7
13                           3.8
```

```
[54]: europedata[europedata['beer_servings']==europedata['beer_servings'].max()]
```

```
[54]:    Continent  country  beer_servings  spirit_servings  wine_servings  \
      56    Europe  Germany            346              117            175

          total_litres_of_pure_alcohol
      56                          11.3
```

```
[55]: europedata['beer_servings'].max()
```

```
[55]: 346
```

```
[61]: (europedata['beer_servings']==europedata['beer_servings'].max()).head()
```

```
[61]: 1     False
      3     False
      5     False
      9     False
      13    False
      Name: beer_servings, dtype: bool
```

```
[74]: europebeer=europedata[europedata['beer_servings']==europedata['beer_servings'].
       ↪max()]
      europebeer
```

```
[74]:    Continent  country  beer_servings  spirit_servings  wine_servings  \
      56    Europe  Germany            346              117            175

          total_litres_of_pure_alcohol
      56                          11.3
```

```
[77]: europewine=europedata[europedata['wine_servings']==europedata['wine_servings'].
       ↪max()]
      europewine
```

```
[77]:    Continent country  beer_servings  spirit_servings  wine_servings  \
      50    Europe  France            127              151            370

          total_litres_of_pure_alcohol
      50                          11.8
```

```
[76]: europespirit=europedata[europedata['spirit_servings']==europedata['spirit_servings'].
       ↪max()]
      europespirit
```

```
[76]:    Continent  country  beer_servings  spirit_servings  wine_servings  \
      26    Europe  Belarus            142              373             42
```

```
    total_litres_of_pure_alcohol
26                          14.4
```

[71]:
```
europebeer.merge(europewine,on='Continent').merge(europespirit,on='Continent')
```

[71]:
```
  Continent country_x  beer_servings_x  spirit_servings_x  wine_servings_x  \
0    Europe   Germany              346                117              175

   total_litres_of_pure_alcohol_x country_y  beer_servings_y  \
0                            11.3    France              127

   spirit_servings_y  wine_servings_y  total_litres_of_pure_alcohol_y  \
0                151              370                            11.8

   country  beer_servings  spirit_servings  wine_servings  \
0  Belarus            142              373             42

   total_litres_of_pure_alcohol
0                          14.4
```

[79]:
```
europemaxes=pd.concat([europebeer,europewine,europespirit])
europemaxes.reset_index()
```

[79]:
```
   index Continent  country  beer_servings  spirit_servings  wine_servings  \
0     56    Europe  Germany            346              117            175
1     50    Europe   France            127              151            370
2     26    Europe  Belarus            142              373             42

   total_litres_of_pure_alcohol
0                          11.3
1                          11.8
2                          14.4
```

On the flip side, I want to see which countries do not consume any alcohol. - `(df['col1']=='x')&(df['col2']=='x')`: This shows us a boolean value. If we put wrap this function with a **df**[] on the outside, it will return a dataframe.

If you want to filter one columnn for multiple criterias, this is a good resource.

[96]:
```
(newalcoholdata['wine_servings']==0)&(newalcoholdata['beer_servings']==0)
```

[96]:
```
0       True
1      False
2      False
3      False
4      False
       …
```

```
159    False
160    False
161    False
162    False
163    False
Length: 156, dtype: bool
```

[97]:
```
#filtering multiple columns by same criteria
noalcohol=newalcoholdata[((newalcoholdata['wine_servings']==0)&(newalcoholdata['beer_servings'
noalcohol
```

[97]:
```
    Continent      country  beer_servings  spirit_servings  wine_servings  \
0        Asia  Afghanistan              0                0              0
12       Asia   Bangladesh              0                0              0
70       Asia         Iran              0                0              0
81       Asia       Kuwait              0                0              0
91       Asia     Maldives              0                0              0
94     Africa   Mauritania              0                0              0
97     Europe       Monaco              0                0              0
117      Asia     Pakistan              0                0              0
136    Africa      Somalia              0                0              0

     total_litres_of_pure_alcohol
0                             0.0
12                            0.0
70                            0.0
81                            0.0
91                            0.0
94                            0.0
97                            0.0
117                           0.0
136                           0.0
```

[98]:
```
noalcohol.count()
```

[98]:
```
Continent                       9
country                         9
beer_servings                   9
spirit_servings                 9
wine_servings                   9
total_litres_of_pure_alcohol    9
dtype: int64
```

1.0.6 Conclusion:

Europe has the largest consumption of alcohol across the world. Germany, France and Belarus takes the crown for beers, wine, and spirits respectively.

As for countries that do not consume alcohol, there are 9 countries in our list which of which most of them are in Asia. Based on this article I found, I believe it is because these countires have a sizable muslim population, therefore consumption of alchol is prohibited.