

# Analiza

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## 1 TIER protocol i tidy data

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### 1.1 Spoycie alkoholu w poszczególnych pastwach na podstawie danych WHO z 2010

Zróżda danych: <https://fivethirtyeight.com/features/dear-mona-followup-where-do-people-drink-the-most-beer-wine-and-spirits/> <https://github.com/fivethirtyeight/data/tree/master/alcohol-consumption>

Dane opisuj spoycie alkoholu w 193 krajach nalecych do ONZ, zostay one podzielone na spoycie piwa, wina, mocnych alkoholi i sumaryczne spoycie czystego alkoholu w litrach. Dane pokazuj rednie spoycie alkoholu przez osoby powyey 15 roku ycia w cigu roku, do redniej nie s brani abscynenci. Jako jednostk(porcj) ang. serving alkoholu uznano: dla piwa standardowa puszka dla wina kieliszek dla napoji wysokoprocentowych kieliszek do szotów

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

drinks = pd.read_csv("../Analysis data/drinks.csv")
#display(drinks)
with pd.option_context('display.max_rows', None, 'display.max_columns', None):
    display(drinks)
```

|    | country           | beer_servings | spirit_servings | \ |
|----|-------------------|---------------|-----------------|---|
| 0  | Afghanistan       | 0             | 0               |   |
| 1  | Albania           | 89            | 132             |   |
| 2  | Algeria           | 25            | 0               |   |
| 3  | Andorra           | 245           | 138             |   |
| 4  | Angola            | 217           | 57              |   |
| 5  | Antigua & Barbuda | 102           | 128             |   |
| 6  | Argentina         | 193           | 25              |   |
| 7  | Armenia           | 21            | 179             |   |
| 8  | Australia         | 261           | 72              |   |
| 9  | Austria           | 279           | 75              |   |
| 10 | Azerbaijan        | 21            | 46              |   |
| 11 | Bahamas           | 122           | 176             |   |
| 12 | Bahrain           | 42            | 63              |   |

|    |                          |     |     |
|----|--------------------------|-----|-----|
| 13 | Bangladesh               | 0   | 0   |
| 14 | Barbados                 | 143 | 173 |
| 15 | Belarus                  | 142 | 373 |
| 16 | Belgium                  | 295 | 84  |
| 17 | Belize                   | 263 | 114 |
| 18 | Benin                    | 34  | 4   |
| 19 | Bhutan                   | 23  | 0   |
| 20 | Bolivia                  | 167 | 41  |
| 21 | Bosnia-Herzegovina       | 76  | 173 |
| 22 | Botswana                 | 173 | 35  |
| 23 | Brazil                   | 245 | 145 |
| 24 | Brunei                   | 31  | 2   |
| 25 | Bulgaria                 | 231 | 252 |
| 26 | Burkina Faso             | 25  | 7   |
| 27 | Burundi                  | 88  | 0   |
| 28 | Cote d'Ivoire            | 37  | 1   |
| 29 | Cabo Verde               | 144 | 56  |
| 30 | Cambodia                 | 57  | 65  |
| 31 | Cameroon                 | 147 | 1   |
| 32 | Canada                   | 240 | 122 |
| 33 | Central African Republic | 17  | 2   |
| 34 | Chad                     | 15  | 1   |
| 35 | Chile                    | 130 | 124 |
| 36 | China                    | 79  | 192 |
| 37 | Colombia                 | 159 | 76  |
| 38 | Comoros                  | 1   | 3   |
| 39 | Congo                    | 76  | 1   |
| 40 | Cook Islands             | 0   | 254 |
| 41 | Costa Rica               | 149 | 87  |
| 42 | Croatia                  | 230 | 87  |
| 43 | Cuba                     | 93  | 137 |
| 44 | Cyprus                   | 192 | 154 |
| 45 | Czech Republic           | 361 | 170 |
| 46 | North Korea              | 0   | 0   |
| 47 | DR Congo                 | 32  | 3   |
| 48 | Denmark                  | 224 | 81  |
| 49 | Djibouti                 | 15  | 44  |
| 50 | Dominica                 | 52  | 286 |
| 51 | Dominican Republic       | 193 | 147 |
| 52 | Ecuador                  | 162 | 74  |
| 53 | Egypt                    | 6   | 4   |
| 54 | El Salvador              | 52  | 69  |
| 55 | Equatorial Guinea        | 92  | 0   |
| 56 | Eritrea                  | 18  | 0   |
| 57 | Estonia                  | 224 | 194 |
| 58 | Ethiopia                 | 20  | 3   |
| 59 | Fiji                     | 77  | 35  |
| 60 | Finland                  | 263 | 133 |

|     |                  |     |     |
|-----|------------------|-----|-----|
| 61  | France           | 127 | 151 |
| 62  | Gabon            | 347 | 98  |
| 63  | Gambia           | 8   | 0   |
| 64  | Georgia          | 52  | 100 |
| 65  | Germany          | 346 | 117 |
| 66  | Ghana            | 31  | 3   |
| 67  | Greece           | 133 | 112 |
| 68  | Grenada          | 199 | 438 |
| 69  | Guatemala        | 53  | 69  |
| 70  | Guinea           | 9   | 0   |
| 71  | Guinea-Bissau    | 28  | 31  |
| 72  | Guyana           | 93  | 302 |
| 73  | Haiti            | 1   | 326 |
| 74  | Honduras         | 69  | 98  |
| 75  | Hungary          | 234 | 215 |
| 76  | Iceland          | 233 | 61  |
| 77  | India            | 9   | 114 |
| 78  | Indonesia        | 5   | 1   |
| 79  | Iran             | 0   | 0   |
| 80  | Iraq             | 9   | 3   |
| 81  | Ireland          | 313 | 118 |
| 82  | Israel           | 63  | 69  |
| 83  | Italy            | 85  | 42  |
| 84  | Jamaica          | 82  | 97  |
| 85  | Japan            | 77  | 202 |
| 86  | Jordan           | 6   | 21  |
| 87  | Kazakhstan       | 124 | 246 |
| 88  | Kenya            | 58  | 22  |
| 89  | Kiribati         | 21  | 34  |
| 90  | Kuwait           | 0   | 0   |
| 91  | Kyrgyzstan       | 31  | 97  |
| 92  | Laos             | 62  | 0   |
| 93  | Latvia           | 281 | 216 |
| 94  | Lebanon          | 20  | 55  |
| 95  | Lesotho          | 82  | 29  |
| 96  | Liberia          | 19  | 152 |
| 97  | Libya            | 0   | 0   |
| 98  | Lithuania        | 343 | 244 |
| 99  | Luxembourg       | 236 | 133 |
| 100 | Madagascar       | 26  | 15  |
| 101 | Malawi           | 8   | 11  |
| 102 | Malaysia         | 13  | 4   |
| 103 | Maldives         | 0   | 0   |
| 104 | Mali             | 5   | 1   |
| 105 | Malta            | 149 | 100 |
| 106 | Marshall Islands | 0   | 0   |
| 107 | Mauritania       | 0   | 0   |
| 108 | Mauritius        | 98  | 31  |

|     |                              |     |     |
|-----|------------------------------|-----|-----|
| 109 | Mexico                       | 238 | 68  |
| 110 | Micronesia                   | 62  | 50  |
| 111 | Monaco                       | 0   | 0   |
| 112 | Mongolia                     | 77  | 189 |
| 113 | Montenegro                   | 31  | 114 |
| 114 | Morocco                      | 12  | 6   |
| 115 | Mozambique                   | 47  | 18  |
| 116 | Myanmar                      | 5   | 1   |
| 117 | Namibia                      | 376 | 3   |
| 118 | Nauru                        | 49  | 0   |
| 119 | Nepal                        | 5   | 6   |
| 120 | Netherlands                  | 251 | 88  |
| 121 | New Zealand                  | 203 | 79  |
| 122 | Nicaragua                    | 78  | 118 |
| 123 | Niger                        | 3   | 2   |
| 124 | Nigeria                      | 42  | 5   |
| 125 | Niue                         | 188 | 200 |
| 126 | Norway                       | 169 | 71  |
| 127 | Oman                         | 22  | 16  |
| 128 | Pakistan                     | 0   | 0   |
| 129 | Palau                        | 306 | 63  |
| 130 | Panama                       | 285 | 104 |
| 131 | Papua New Guinea             | 44  | 39  |
| 132 | Paraguay                     | 213 | 117 |
| 133 | Peru                         | 163 | 160 |
| 134 | Philippines                  | 71  | 186 |
| 135 | Poland                       | 343 | 215 |
| 136 | Portugal                     | 194 | 67  |
| 137 | Qatar                        | 1   | 42  |
| 138 | South Korea                  | 140 | 16  |
| 139 | Moldova                      | 109 | 226 |
| 140 | Romania                      | 297 | 122 |
| 141 | Russian Federation           | 247 | 326 |
| 142 | Rwanda                       | 43  | 2   |
| 143 | St. Kitts & Nevis            | 194 | 205 |
| 144 | St. Lucia                    | 171 | 315 |
| 145 | St. Vincent & the Grenadines | 120 | 221 |
| 146 | Samoa                        | 105 | 18  |
| 147 | San Marino                   | 0   | 0   |
| 148 | Sao Tome & Principe          | 56  | 38  |
| 149 | Saudi Arabia                 | 0   | 5   |
| 150 | Senegal                      | 9   | 1   |
| 151 | Serbia                       | 283 | 131 |
| 152 | Seychelles                   | 157 | 25  |
| 153 | Sierra Leone                 | 25  | 3   |
| 154 | Singapore                    | 60  | 12  |
| 155 | Slovakia                     | 196 | 293 |
| 156 | Slovenia                     | 270 | 51  |

|     |                      |     |     |
|-----|----------------------|-----|-----|
| 157 | Solomon Islands      | 56  | 11  |
| 158 | Somalia              | 0   | 0   |
| 159 | South Africa         | 225 | 76  |
| 160 | Spain                | 284 | 157 |
| 161 | Sri Lanka            | 16  | 104 |
| 162 | Sudan                | 8   | 13  |
| 163 | Suriname             | 128 | 178 |
| 164 | Swaziland            | 90  | 2   |
| 165 | Sweden               | 152 | 60  |
| 166 | Switzerland          | 185 | 100 |
| 167 | Syria                | 5   | 35  |
| 168 | Tajikistan           | 2   | 15  |
| 169 | Thailand             | 99  | 258 |
| 170 | Macedonia            | 106 | 27  |
| 171 | Timor-Leste          | 1   | 1   |
| 172 | Togo                 | 36  | 2   |
| 173 | Tonga                | 36  | 21  |
| 174 | Trinidad & Tobago    | 197 | 156 |
| 175 | Tunisia              | 51  | 3   |
| 176 | Turkey               | 51  | 22  |
| 177 | Turkmenistan         | 19  | 71  |
| 178 | Tuvalu               | 6   | 41  |
| 179 | Uganda               | 45  | 9   |
| 180 | Ukraine              | 206 | 237 |
| 181 | United Arab Emirates | 16  | 135 |
| 182 | United Kingdom       | 219 | 126 |
| 183 | Tanzania             | 36  | 6   |
| 184 | USA                  | 249 | 158 |
| 185 | Uruguay              | 115 | 35  |
| 186 | Uzbekistan           | 25  | 101 |
| 187 | Vanuatu              | 21  | 18  |
| 188 | Venezuela            | 333 | 100 |
| 189 | Vietnam              | 111 | 2   |
| 190 | Yemen                | 6   | 0   |
| 191 | Zambia               | 32  | 19  |
| 192 | Zimbabwe             | 64  | 18  |

|   | 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                          |
| 5 | 45            | 4.9                          |
| 6 | 221           | 8.3                          |
| 7 | 11            | 3.8                          |
| 8 | 212           | 10.4                         |
| 9 | 191           | 9.7                          |

|    |     |      |
|----|-----|------|
| 10 | 5   | 1.3  |
| 11 | 51  | 6.3  |
| 12 | 7   | 2.0  |
| 13 | 0   | 0.0  |
| 14 | 36  | 6.3  |
| 15 | 42  | 14.4 |
| 16 | 212 | 10.5 |
| 17 | 8   | 6.8  |
| 18 | 13  | 1.1  |
| 19 | 0   | 0.4  |
| 20 | 8   | 3.8  |
| 21 | 8   | 4.6  |
| 22 | 35  | 5.4  |
| 23 | 16  | 7.2  |
| 24 | 1   | 0.6  |
| 25 | 94  | 10.3 |
| 26 | 7   | 4.3  |
| 27 | 0   | 6.3  |
| 28 | 7   | 4.0  |
| 29 | 16  | 4.0  |
| 30 | 1   | 2.2  |
| 31 | 4   | 5.8  |
| 32 | 100 | 8.2  |
| 33 | 1   | 1.8  |
| 34 | 1   | 0.4  |
| 35 | 172 | 7.6  |
| 36 | 8   | 5.0  |
| 37 | 3   | 4.2  |
| 38 | 1   | 0.1  |
| 39 | 9   | 1.7  |
| 40 | 74  | 5.9  |
| 41 | 11  | 4.4  |
| 42 | 254 | 10.2 |
| 43 | 5   | 4.2  |
| 44 | 113 | 8.2  |
| 45 | 134 | 11.8 |
| 46 | 0   | 0.0  |
| 47 | 1   | 2.3  |
| 48 | 278 | 10.4 |
| 49 | 3   | 1.1  |
| 50 | 26  | 6.6  |
| 51 | 9   | 6.2  |
| 52 | 3   | 4.2  |
| 53 | 1   | 0.2  |
| 54 | 2   | 2.2  |
| 55 | 233 | 5.8  |
| 56 | 0   | 0.5  |
| 57 | 59  | 9.5  |

|     |     |      |
|-----|-----|------|
| 58  | 0   | 0.7  |
| 59  | 1   | 2.0  |
| 60  | 97  | 10.0 |
| 61  | 370 | 11.8 |
| 62  | 59  | 8.9  |
| 63  | 1   | 2.4  |
| 64  | 149 | 5.4  |
| 65  | 175 | 11.3 |
| 66  | 10  | 1.8  |
| 67  | 218 | 8.3  |
| 68  | 28  | 11.9 |
| 69  | 2   | 2.2  |
| 70  | 2   | 0.2  |
| 71  | 21  | 2.5  |
| 72  | 1   | 7.1  |
| 73  | 1   | 5.9  |
| 74  | 2   | 3.0  |
| 75  | 185 | 11.3 |
| 76  | 78  | 6.6  |
| 77  | 0   | 2.2  |
| 78  | 0   | 0.1  |
| 79  | 0   | 0.0  |
| 80  | 0   | 0.2  |
| 81  | 165 | 11.4 |
| 82  | 9   | 2.5  |
| 83  | 237 | 6.5  |
| 84  | 9   | 3.4  |
| 85  | 16  | 7.0  |
| 86  | 1   | 0.5  |
| 87  | 12  | 6.8  |
| 88  | 2   | 1.8  |
| 89  | 1   | 1.0  |
| 90  | 0   | 0.0  |
| 91  | 6   | 2.4  |
| 92  | 123 | 6.2  |
| 93  | 62  | 10.5 |
| 94  | 31  | 1.9  |
| 95  | 0   | 2.8  |
| 96  | 2   | 3.1  |
| 97  | 0   | 0.0  |
| 98  | 56  | 12.9 |
| 99  | 271 | 11.4 |
| 100 | 4   | 0.8  |
| 101 | 1   | 1.5  |
| 102 | 0   | 0.3  |
| 103 | 0   | 0.0  |
| 104 | 1   | 0.6  |
| 105 | 120 | 6.6  |

|     |     |      |
|-----|-----|------|
| 106 | 0   | 0.0  |
| 107 | 0   | 0.0  |
| 108 | 18  | 2.6  |
| 109 | 5   | 5.5  |
| 110 | 18  | 2.3  |
| 111 | 0   | 0.0  |
| 112 | 8   | 4.9  |
| 113 | 128 | 4.9  |
| 114 | 10  | 0.5  |
| 115 | 5   | 1.3  |
| 116 | 0   | 0.1  |
| 117 | 1   | 6.8  |
| 118 | 8   | 1.0  |
| 119 | 0   | 0.2  |
| 120 | 190 | 9.4  |
| 121 | 175 | 9.3  |
| 122 | 1   | 3.5  |
| 123 | 1   | 0.1  |
| 124 | 2   | 9.1  |
| 125 | 7   | 7.0  |
| 126 | 129 | 6.7  |
| 127 | 1   | 0.7  |
| 128 | 0   | 0.0  |
| 129 | 23  | 6.9  |
| 130 | 18  | 7.2  |
| 131 | 1   | 1.5  |
| 132 | 74  | 7.3  |
| 133 | 21  | 6.1  |
| 134 | 1   | 4.6  |
| 135 | 56  | 10.9 |
| 136 | 339 | 11.0 |
| 137 | 7   | 0.9  |
| 138 | 9   | 9.8  |
| 139 | 18  | 6.3  |
| 140 | 167 | 10.4 |
| 141 | 73  | 11.5 |
| 142 | 0   | 6.8  |
| 143 | 32  | 7.7  |
| 144 | 71  | 10.1 |
| 145 | 11  | 6.3  |
| 146 | 24  | 2.6  |
| 147 | 0   | 0.0  |
| 148 | 140 | 4.2  |
| 149 | 0   | 0.1  |
| 150 | 7   | 0.3  |
| 151 | 127 | 9.6  |
| 152 | 51  | 4.1  |
| 153 | 2   | 6.7  |



|     |     |      |
|-----|-----|------|
| 154 | 11  | 1.5  |
| 155 | 116 | 11.4 |
| 156 | 276 | 10.6 |
| 157 | 1   | 1.2  |
| 158 | 0   | 0.0  |
| 159 | 81  | 8.2  |
| 160 | 112 | 10.0 |
| 161 | 0   | 2.2  |
| 162 | 0   | 1.7  |
| 163 | 7   | 5.6  |
| 164 | 2   | 4.7  |
| 165 | 186 | 7.2  |
| 166 | 280 | 10.2 |
| 167 | 16  | 1.0  |
| 168 | 0   | 0.3  |
| 169 | 1   | 6.4  |
| 170 | 86  | 3.9  |
| 171 | 4   | 0.1  |
| 172 | 19  | 1.3  |
| 173 | 5   | 1.1  |
| 174 | 7   | 6.4  |
| 175 | 20  | 1.3  |
| 176 | 7   | 1.4  |
| 177 | 32  | 2.2  |
| 178 | 9   | 1.0  |
| 179 | 0   | 8.3  |
| 180 | 45  | 8.9  |
| 181 | 5   | 2.8  |
| 182 | 195 | 10.4 |
| 183 | 1   | 5.7  |
| 184 | 84  | 8.7  |
| 185 | 220 | 6.6  |
| 186 | 8   | 2.4  |
| 187 | 11  | 0.9  |
| 188 | 3   | 7.7  |
| 189 | 1   | 2.0  |
| 190 | 0   | 0.1  |
| 191 | 4   | 2.5  |
| 192 | 4   | 4.7  |

### 1.1.1 Tidy data

```
[2]: drinks.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 193 entries, 0 to 192
```

```
Data columns (total 5 columns):
country                193 non-null object
beer_servings          193 non-null int64
spirit_servings        193 non-null int64
wine_servings          193 non-null int64
total_litres_of_pure_alcohol  193 non-null float64
dtypes: float64(1), int64(3), object(1)
memory usage: 7.6+ KB
```

Na podstawie pandas info() mona stwierdzić e nie ma pustych wierszy.

Dane s uporządkowane. Każda kolumna to jedna zmienna, obserwacjami s kraje w wierszach. Mamy jedn tabelę jako e mamy jedn jednostk obserwacyjn. Z tego powodu nie musiałem nic poprawiać w dataframe.

### 1.1.2 Opis danych

```
[3]: drinks.describe()
```

```
[3]:
```

|       | beer_servings | spirit_servings | wine_servings | \ |
|-------|---------------|-----------------|---------------|---|
| count | 193.000000    | 193.000000      | 193.000000    |   |
| mean  | 106.160622    | 80.994819       | 49.450777     |   |
| std   | 101.143103    | 88.284312       | 79.697598     |   |
| min   | 0.000000      | 0.000000        | 0.000000      |   |
| 25%   | 20.000000     | 4.000000        | 1.000000      |   |
| 50%   | 76.000000     | 56.000000       | 8.000000      |   |
| 75%   | 188.000000    | 128.000000      | 59.000000     |   |
| max   | 376.000000    | 438.000000      | 370.000000    |   |

  

|       | total_litres_of_pure_alcohol |
|-------|------------------------------|
| count | 193.000000                   |
| mean  | 4.717098                     |
| std   | 3.773298                     |
| min   | 0.000000                     |
| 25%   | 1.300000                     |
| 50%   | 4.200000                     |
| 75%   | 7.200000                     |
| max   | 14.400000                    |

```
[4]: copy_drinks = drinks.copy()
copy_drinks.sort_values(by=['beer_servings'], inplace=True, ascending=False)
df1 = copy_drinks[['country', 'beer_servings']]
copy_drinks.sort_values(by=['spirit_servings'], inplace=True, ascending=False)
df2 = copy_drinks[['country', 'spirit_servings']]
copy_drinks.sort_values(by=['wine_servings'], inplace=True, ascending=False)
df3 = copy_drinks[['country', 'wine_servings']]
print("Top 5 państw spożywających najwięcej piwa")
display(df1.head(5))
print("\n\nTop 5 państw spożywających najwięcej alkoholu wysokoprocentowych")
display(df2.head(5))
```

```
print("\n\nTop 5 pastw spoywajcych najwiecej wina")
display(df3.head(5))
```

Top 5 pastw spoywajcych najwiecej piwa

|     | country        | beer_servings |
|-----|----------------|---------------|
| 117 | Namibia        | 376           |
| 45  | Czech Republic | 361           |
| 62  | Gabon          | 347           |
| 65  | Germany        | 346           |
| 98  | Lithuania      | 343           |

Top 5 pastw spoywajcych najwiecej alkoholi wysokoprocentowych

|     | country            | spirit_servings |
|-----|--------------------|-----------------|
| 68  | Grenada            | 438             |
| 15  | Belarus            | 373             |
| 73  | Haiti              | 326             |
| 141 | Russian Federation | 326             |
| 144 | St. Lucia          | 315             |

Top 5 pastw spoywajcych najwiecej wina

|     | country     | wine_servings |
|-----|-------------|---------------|
| 61  | France      | 370           |
| 136 | Portugal    | 339           |
| 3   | Andorra     | 312           |
| 166 | Switzerland | 280           |
| 48  | Denmark     | 278           |

### 1.1.3 Histogramy

```
[5]: ax = drinks.hist(figsize = (10,30), layout = (4,1), bins=50 )
plt.show()
```



