Bielefeld University
Faculty of Technology

Genome Data Science
M.Sc. Luna Pianesi

Programming
Winter 2023

Exercises

Number 09, Submission Deadline: January 7, 23:59, 2024

1. Demographics of Germany (7P)

Use the demographic data set of the lecture to answer the following questions by grouping / agglomerating the data:

1. How many women aged 60 years and older live in the federal states Nordrhein-Westfalen, Bayern, and Baden-Wuerttemberg alltogether? (2P)
2. List the relative population (in percentage) of 0-21 year-olds of all federal states. Which state contributes most? Is this also the state with the highest overall population? (3P)
3. Which federal state has the *relatively* biggest fraction of female population? (2P)

[19]:
```
import pandas as pd

demogrphx = pd.read_table('course_material_09/12111-04-01-4-B_processed3.tsv',
                          index_col = [0, 1], header=[0, 1])
demogrphx
```

[19]:

		Population		
		Male	Female	Total
FederalState	Age			
Schleswig-Holstein	0	11132	10400	21532
	1	11504	10360	21864
	2	11733	11067	22800
	3	12214	11147	23361
	4	12142	10945	23087
...		...	...	...
Thueringen	96	149	599	748
	97	75	476	551
	98	47	275	322
	99	30	181	211
	100	32	248	280

[1616 rows x 3 columns]

2. Employment in Germany (6P)

The following data is a minimally processed data set of employment rates from the same census in Germany. It contains the following columns (from left to right):

- Bundesland (federal state)

- Altersgruppe (age group)
- Bevoelkerung nach Erwerbsstatus (population by employment status)
- Erwerbspersonen (working population)
- Erwerbstaetige [Insgesamt/maennlich/weiblich] (Employed people [total/male/female])
- Erwerbslose [Insgesamt/maennlich/weiblich] (Unemployed people [total/male/female])
- Nichterwerbspersonen [Insgesamt/maennlich/weiblich] (non-working population [total/-male/female])

[18]:
```
employment_data = pd.read_csv('course_material_09/12111-12-01-4-B_processed.tsv',
                              header=[0, 1], index_col=0, delimiter='\t')
employment_data
```

[18]:

	Altersgruppe	Bevoelkerung nach Erwerbsstatus	\
	Altersgruppe	Bevoelkerung nach Erwerbsstatus	
Bundesland			
Schleswig-Holstein	0	110530	
Schleswig-Holstein	5	122650	
Schleswig-Holstein	10	148350	
Schleswig-Holstein	15	155100	
Schleswig-Holstein	20	154120	
...	...	...	
Thueringen	70	156780	
Thueringen	75	100740	
Thueringen	80	69390	
Thueringen	85	36940	
Thueringen	90	12620	

	Erwerbspersonen	Erwerbstaetige		\
	Erwerbspersonen	Insgesamt	maennlich	weiblich
Bundesland				
Schleswig-Holstein	0	0	0	0
Schleswig-Holstein	0	0	0	0
Schleswig-Holstein	0	0	0	0
Schleswig-Holstein	61740	55810	28760	27060
Schleswig-Holstein	121930	114140	59000	55140
...	...	...	...	...
Thueringen	11320	11130	6630	4490
Thueringen	4260	4230	2310	1930
Thueringen	2350	2350	1130	1220
Thueringen	1040	1040	380	660
Thueringen	0	0	0	0

	Erwerbslose			Nichterwerbspersonen	\
	Insgesamt	maennlich	weiblich	Insgesamt	
Bundesland					
Schleswig-Holstein	0	0	0	110530	
Schleswig-Holstein	0	0	0	122650	

```
Schleswig-Holstein           0         0       0                148350
Schleswig-Holstein        5920      3050    2870                 93360
Schleswig-Holstein        7790      4370    3420                 32200
...                        ...       ...     ...                   ...
Thueringen                   0         0       0                145460
Thueringen                   0         0       0                 96490
Thueringen                   0         0       0                 67030
Thueringen                   0         0       0                 35900
Thueringen                   0         0       0                 12280


                  maennlich weiblich
Bundesland
Schleswig-Holstein     58600    51940
Schleswig-Holstein     63730    58920
Schleswig-Holstein     75960    72390
Schleswig-Holstein     45210    48150
Schleswig-Holstein     14650    17540
...                      ...      ...
Thueringen             64380    81080
Thueringen             39720    56770
Thueringen             22890    44140
Thueringen              9130    26770
Thueringen              2470     9810

[304 rows x 12 columns]
```

Answer the following questions by querying the employment data set:

1. What is the average age group of employed women in Germany? (2P)
2. What is the average age group of employed women in each of the federal states? (2P)
3. What is the age group with highest unemployment rate of the working population? (2P)

Important! Upload your solutions as adequately commented Jupyter Notebook (2P)