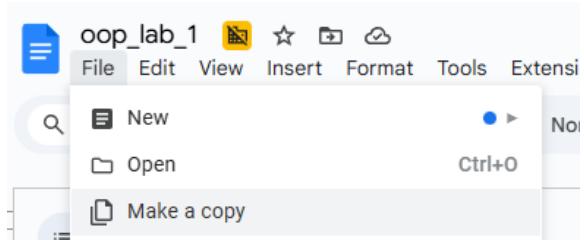


OOP programming laboratory 1

Make a copy of this lab (File->Make a copy) and answer the questions posted in this lab there

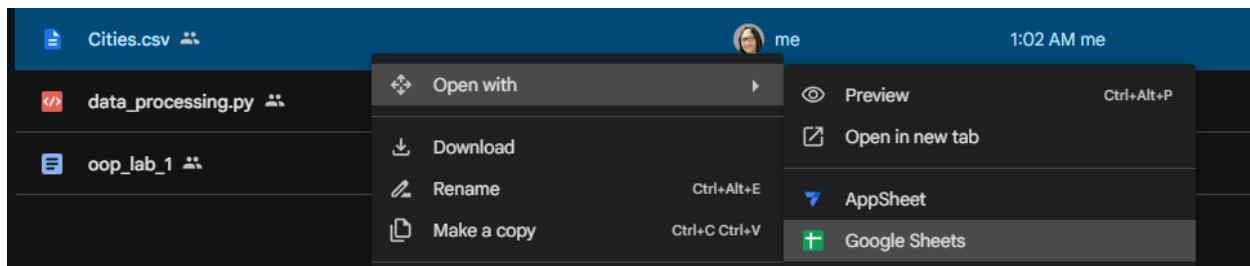


You will need to access files from the following link:

[oop_lab_1](#)

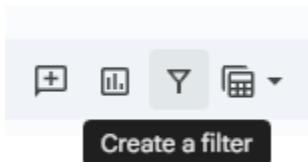
Google Sheets

- Open the Cities.csv file with Google Sheets



Filtering

- List all cities in Germany
- List cities in Spain with a temperature above 12°C



B1 ↴ | fx country

	A	B	C	D	E
1	city	country	latitude	longitude	temperature
2	Aalborg	Denmark			52
3	Aberdeen	United Kingdom			3.1
4	Abisko	Sweden			0.2
5	Adana	Turkey			67
6	Albacete	Spain			62
7	Algeciras	Spain			38
8	Amiens	France			17
9	Amsterdam	Netherlands			93
10	Ancona	Italy			52
11	Andorra	Andorra			9.6
12	Angers	France			98
13	Ankara	Turkey			86
14	Antalya	Turkey			88
15	Arad	Romania			32
16	Athens	Greece			41
17	Augsburg	Germany			54
18	Bacau	Romania			51
19	Badajoz	Spain			61
20	Baia Mare	Romania			87
21	Balti	Moldova			23
22	Barcelona	Spain			78
23	Bari	Italy			15
24	Basel	Switzerland			68
25	Batman	Turkey			16
26	Belfast	United Kingdom			48

Sort A to Z
Sort Z to A
Sort by color
Filter by color
▶ Filter by condition
▼ Filter by values
[Select all 38 - Clear](#) Displaying 38

✓ (Blanks)
✓ Albania
✓ Andorra
✓ Austria

Cancel OK



Remove filter

(when done)

Aggregation

- What is the average temperature across all cities?
- Count the number of unique countries

E	F	G	H	I	J
temperature		9.497840376 ×			
7.52		=AVERAGE(E2:E)			
8.1					
0.2					
18.67					
12.62					
17.38					
10.17					
8.93					
13.52					
9.6					
10.98					

Filtering + Aggregation

(Hint: filter and make a copy to another sheet, then aggregate)

- What is the average temperature for all the cities in Germany
- What is the max temperature for all the cities in Italy

Answer the following questions:

- Find the maximum latitude
- Find cities north of 50° latitude and west of 5° longitude
- Show cities where temperature is below 10°C and country is not Sweden
- What is the lowest temperature recorded in this table?
- Retrieve cities with latitude greater than 45° and temperature between 5°C and 12°C.
- Find cities in France or Italy with latitude above 45°.
- List cities whose names start with “A” and are located east of longitude 0°.
- Show the country with the highest average city temperature.
- For each country, count cities with temperatures above 10°C.
- Find the coldest city in Spain

Python code

Commit 1

- On your local computer, create a git repository called oop_lab_1
- Copy the following files to that directory:
 - data_processing.py
 - Cities.csv
- Open and run data_processing.py and observe the outcome
- Study the code and see if you understand it
- Complete the part marked “Your code here”

- Once done, commit the two files to your local and remote repository with a message like ‘Initial commit for data processing code’

Commit 2

- Code in commit 1 leaves room for refactoring
- Study the lambda functions from the following link:

<https://realpython.com/python-lambda/>

- Let’s now define two functions:

```
# Let's write a function to filter out only items that meet the condition
# Hint: condition will be associated with an anonymous function,
e.g., lambda x: max(x)
def filter(condition, dict_list):

# Let's write a function to do aggregation given an aggregation function and an aggregation key
def aggregate(aggregation_key, aggregation_function, dict_list):
```

- Use the two functions to get the same actions as code in Commit 1

```
# Print the average temperature of all the cities

# Print all cities in Germany

# Print all cities in Spain with a temperature above 12°C

# Count the number of unique countries

# Print the average temperature for all the cities in Germany

# Print the max temperature for all the cities in Italy
```

- Once you are done, make another commit to your local and remote repo with a meaningful message to go with it, e.g., “Refactor the code into a procedural style code.”
- Go to your TAs to show your commit history in your Github repository so that they can check you off for this second task

Answer the following questions:

- Paste the link to your oop_lab_1 Github repository here

Preparing for Commit 3

- We want to turn the code in Commit 2 from a procedural-style code into an OOP-style code
- Let's think what you have to do:
 - Probably need a "DataLoader" class to load a csv file and convert them into a Table
 - Probably need a "Table" class
 - What operations are needed in that class
 - How do we define `__init__` in that class