Wrocław University of Science and Technology

PYTHON
LABORATORY REPORT

Faculty of Electronics, Photonics and MicrosystemsPYTHON LABORATORY

Theme of class: Data Types,Files

Student: Hayrettin Aycetin (276807)
Date of class: 06.11.2023 15:15-16:55
Group No:3
Submition Date:19.11.2023

Lab assistant: Aleksander Kubeczek, Alicja Kwaśny GRADE:

Task 1

Write a Python program to calculate the product, multiplying all the numbers in a given tuples

Original Tuple: (4, 3, 2, 2, -1, 18)
Product multiplying all the numbers of the said tuple: -864
Original Tuple: (2, 4, 8, 8, 3, 2, 9)
Product multiplying all the numbers of the said tuple: 27648

```
def tuple_multiplication(x):
    result =1
    for i in range(len(x)):
        result = result * x[i]
    print(result)

tuple_multiplication(original_tuple_1)
tuple_multiplication(original_tuple_2)
```

Comments:

I just made a basic function which takes result as 1 since 1 has no power on multiplication.Then I iterate over the tuple and change the results one by one.

Task 2

Write a Python function to check if a list is a palindrome or not. Return true otherwise false.

```
def polindrom(x):
    reversed_list = x[::-1]
    if x == reversed_list:
        print("True")
    else:
        print("False")
```

Comments:

I just made a basic function which takes x as a parameter and equals reversed x to reversed_list to check if its equal to normal one and prints true or false.

Task 3

Write a Python program to find all keys in a dictionary that have the given value.
Sample Output:
Original dictionary elements:
{'Theodore': 19, 'Roxanne': 20, 'Mathew': 21, 'Betty': 20}
Find all keys in the said dictionary that have the specified value:
['Roxanne', 'Betty']

```
my_dict = {'Theodore': 19, 'Roxanne': 20, 'Mathew': 21, 'Betty': 20}

for x, y in my_dict.items():
    if y == 20:
        print(x)
    else:
        pass
```

Comments:

I just made a basic for loop to iterate over key and values and I am looking for Betty and Roxanne keys whose values are 20 so I just print x if y equals to 20.

X – keys
Y-values

Task 4

Write a Python program that removes all duplicate elements from an array and returns a new array.
Sample Output:
Original array: 1 3 5 1 3 7 9
After removing duplicate elements from the said array: 1 3 5 7 9
Original array: 2 4 2 6 4 8
After removing duplicate elements from the said array: 2 4 6 8

```python
import numpy as np

list_1 = set([1,3,5,1,3,7,9])
list_2 = set([2,4,2,6,4,8])

array_1 = np.array(list_1)

array_2 = np.array(list_2)

print("First array: ", array_1)
print("Second array: ", array_2)
```

Comments:

I define my array as list firstly to use set() function from numpy library to clean duplicates then I turned those lists to array.

Task 5

Write a Python program to write and read a list content to and from a file. It could be comma separated file, .txt, etc, your choice.

```python
def reading_from_file(filename):
    f = open(filename, "r")
    print(f.read())
```

test_file.txt

```
1   my_list = [1,2,3,4,5]
```

Output:

```
PS C:\Users\HARETTİN\Desktop\UNI\Semester 3\Python\Lab\List2> python task5.py
my_list = [1,2,3,4,5]
```

```
def writing_to_file():
    f = open("test_file2","w")
    f.write("my_list2 = [1,3,5,7,9]")
    f.close()
```

```
reading_from_file("test_file.txt")
writing_to_file()
```

Output:

```
1    my_list2 = [1,3,5,7,9]
```

Comments:

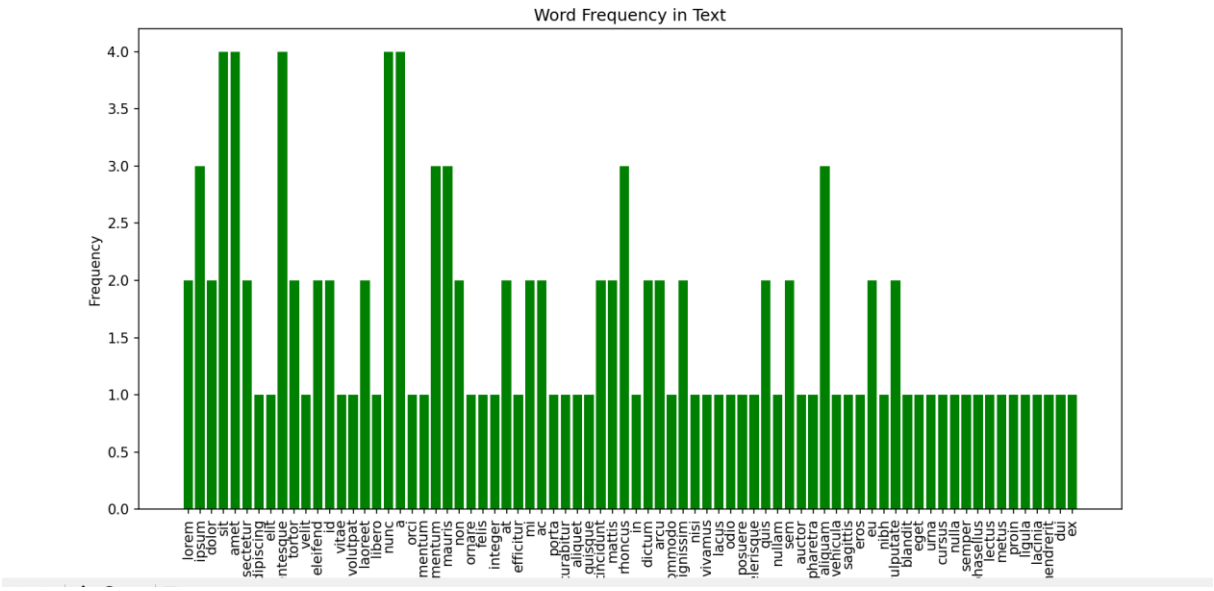
I defined two functions first one is reading from file and the second one is writing to file.Using the synthax of python I successfully managed to read and write from txt file.

Task 6

Write a Python program to count the frequency of words in a file. Plot the results using bar graph

task6.py > ...

```
import matplotlib.pyplot as plt
import numpy as np

f = open("word_frequency.txt","r")
text = f.read()

word_frequency = {}

words = text.split()

for word in words:
    word = word.strip('.,?!').lower()
    if word in word_frequency:
        word_frequency[word] +=1
    else:
        word_frequency[word] = 1


x = word_frequency.keys()
y = word_frequency.values()

plt.bar(x, y,color='green')
plt.xlabel("Words")
plt.ylabel("Frequency")
plt.title("Word Frequency in Text")
plt.xticks(rotation='vertical')
plt.show()
```



Comments:

For starting I generated a lorem ipsum text from an online generator and upload it as a word_frequency.txt you can see it on the zip. Then I opened it with f and read the text with f.read command and make it equal to text. Then I used built-in function split to separate words as a list from the text. After this step I used a for loop to check the word frequency and also I just cut the punctuations with strip and make all the words lower. I stored words in a dictionary to use if and else statements to count. Lastly I assigned keys of this dictionary to x and values to y and made a plot.

Task 7

Write a Python program to handle a ZeroDivisionError exception when dividing a number by zero.

```
def divide_numbers(dividend, divisor):
    if int(divisor) == 0:
        print("Cannot divide by zero")
    else:
        print(round(float(dividend)/float(divisor),2))

divide_numbers(x,y)
```

Comments:

Firstly I defined a function which takes dividend and divisor as parameters then checks divisor if its zero to handle ZeroDivisionError.

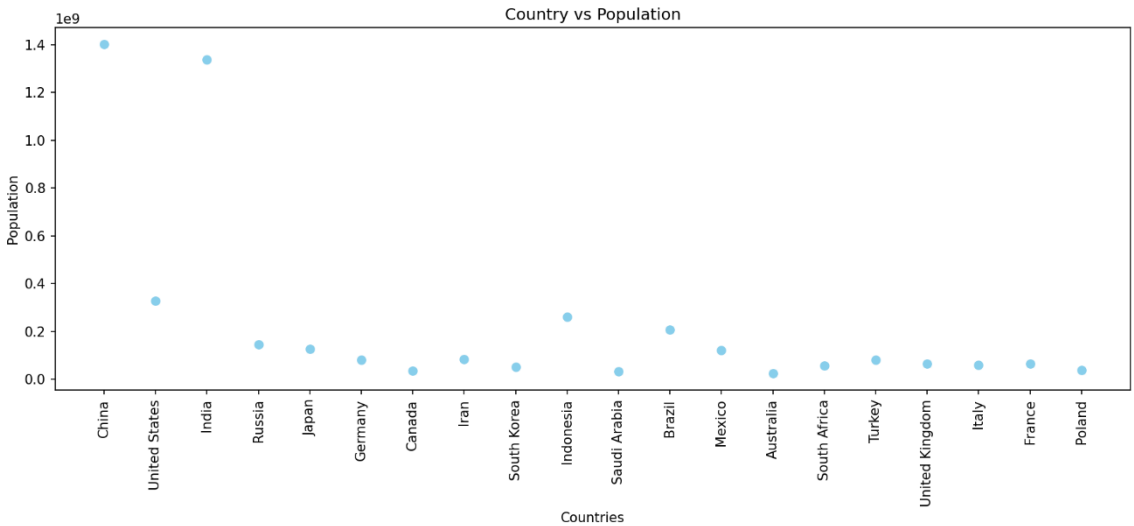
Task 8

Read CO2 emission file and visualize the data in at least 2 different type of charts of your choice, then save them in 3 different picture formats of your choice. The graphs should make logical sense and one should be able to read them.

First Visualization: Country vs Population

```
import matplotlib.pyplot as plt
import pandas as pd
data = pd.read_csv("CO2 emission.csv", sep=";")


countries = data.iloc[1:21,1].astype(str)
population = data.iloc[1:21, 4].str.replace(',', '').astype(float)


plt.scatter(countries, population,color='skyblue')
plt.title("Country vs Population")
plt.xlabel("Countries")
plt.ylabel("Population")
plt.xticks(rotation='vertical')
plt.tight_layout()

plt.savefig('country_vs_population.png')
plt.savefig('country_vs_population.jpeg')
plt.savefig('country_vs_population.svg')

plt.show()
```

Output:



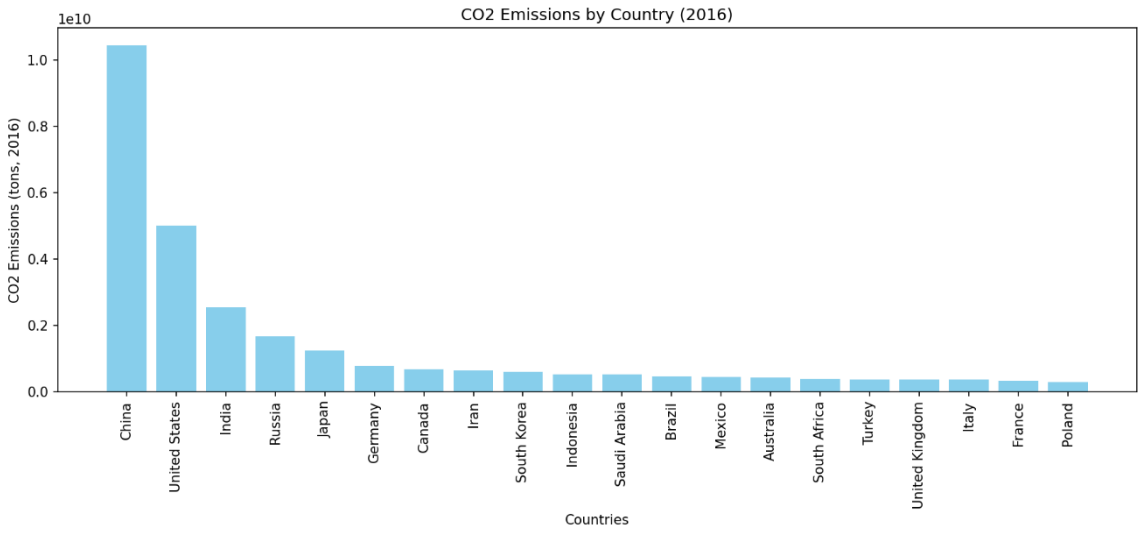
Comments:

Firstly I used read_csv command to read csv as data file as a dataframe and after used data.iloc to Purely integer-location based indexing for selection by position(from documentation).To take countries it was easy but to take population I needed to replace ‘,’ as empty string and define it as float type.After I used basic graph properties like labeling etc and I made a scatter plot.In the end I used savefig() command to save figures and show () command to show . Its important to save first then show otherwise the saved figures were empty.

Second Visualization: Country vs CO2 Emission

```
import matplotlib.pyplot as plt
import pandas as pd
data = pd.read_csv("CO2 emission.csv", sep=";")


countries = data.iloc[1:21,1].astype(str)
co2_emission = data.iloc[1:21, 2].str.replace(',', '').astype(float)


plt.bar(countries, co2_emission, color='skyblue')
plt.title("CO2 Emissions by Country (2016)")
plt.xlabel("Countries")
plt.ylabel("CO2 Emissions (tons, 2016)")
plt.xticks(rotation='vertical')
plt.tight_layout()


plt.savefig('co2_emission_vs_countries.png')
plt.savefig('co2_emission_vs_countries.jpeg')
plt.savefig('co2_emission_vs_countries.svg')
plt.show()
```

Output:



Comments:
I made this one with the same approach like the previous but in this one I just changed scatter to bar.