

# Coursework\_O2\_v2

November 12, 2019

## 1 Coursework Output 2

*Instructions:* In this coursework, you will show your domain of the data related Python skills required for business analytics. To do so, you will use packages such as *numpy* and *matplotlib*.

### 1.1 Importing and Visualising a Dataset in Python

Each student will be assigned a different dataset in a *comma separated value (.csv)* format. The main goal is to import such dataset into Python so that you can wrangle and visualise the data in better ways. This will allow you to get your own conclusions and start building up knowledge regarding on how you could potentially learn from data to predict or classify future instances.

You must create a program which allows you to select from the following options: 1. Import and print your dataset into Python as a numpy array. 2. Query and print an instance of the dataset by row number or by id (i.e. first column of the table). 3. Create a “reduced” dataset (i.e. with less columns) by indicating a list of column names to bring upon this newly created dataset. 4. Plot the dataset by means of a scatterplot which relates two columns specified by the user. The plot has to show the *x* and *y* axis labels as the chosen columns, and use the *target/class* column (i.e. the last one) as the colour variable. 5. Exit the program.

### 1.2 Additional Considerations

- The program has to check that every input is valid.
- No option (except for exit) can be executed until option 1 is executed first.

### 1.3 Submission Instructions

- Once that you have finished your program, run all cells and run the main program cell using the following sequence of options: 0(wrong option),2(has to fail),1,2(by row index),2(by row name),3,4,5.
- Then, without clearing the kernel, generate a html **OR** pdf file from the Jupyter notebook.
- Clear the Jupyter notebook kernel, then name both the Jupyter notebook and the html/pdf files with your id number and submit them to the corresponding Moodle’s dropbox before **12th December, 2019**.

```
In [1]: ## Use this cell to import all necessary packages
```

```
In [2]: ## Use this cell to define the function corresponding to OPTION 1
```

```
def option1():
    '''With this function you import the dataset into a numpy array.'''
    return
```

In [4]: ## Use this cell to define the function corresponding to OPTION 2

```
def option2():
    '''This function queries and prints a row of the dataset (by row number or id).'''
    return
```

In [5]: ## Use this cell to define the function corresponding to OPTION 3

```
def option3():
    '''This function creates a new dataset by indicating which columns to include.'''
    return
```

In [6]: ## Use this cell to define the function corresponding to OPTION 4

```
def option4():
    '''This function visualises the dataset using a scatterplot.'''
    return
```

In [8]: ## Use this cell to create the "main" part of your program

```
print("Welcome to **STUDENT'S NAME AND ID** business case.")
```

Welcome to Carlos Moreno-Garcia 1813072 business case.

Select and option

>> 0

Error, try again

Select and option

>> 2

The first option to be selected shall be 1. Please try again

Select and option

>> 1

The dataset has been imported!

```
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
[[1.00e+00 5.10e+00 3.50e+00 1.40e+00 2.00e-01 1.00e+00]
 [2.00e+00 4.90e+00 3.00e+00 1.40e+00 2.00e-01 1.00e+00]
 [3.00e+00 4.70e+00 3.20e+00 1.30e+00 2.00e-01 1.00e+00]
 [4.00e+00 4.60e+00 3.10e+00 1.50e+00 2.00e-01 1.00e+00]
 [5.00e+00 5.00e+00 3.60e+00 1.40e+00 2.00e-01 1.00e+00]
 [6.00e+00 5.40e+00 3.90e+00 1.70e+00 4.00e-01 1.00e+00]
 [7.00e+00 4.60e+00 3.40e+00 1.40e+00 3.00e-01 1.00e+00]
 [8.00e+00 5.00e+00 3.40e+00 1.50e+00 2.00e-01 1.00e+00]
 [9.00e+00 4.40e+00 2.90e+00 1.40e+00 2.00e-01 1.00e+00]
 [1.00e+01 4.90e+00 3.10e+00 1.50e+00 1.00e-01 1.00e+00]
 [1.10e+01 5.40e+00 3.70e+00 1.50e+00 2.00e-01 1.00e+00]
 [1.20e+01 4.80e+00 3.40e+00 1.60e+00 2.00e-01 1.00e+00]
 [1.30e+01 4.80e+00 3.00e+00 1.40e+00 1.00e-01 1.00e+00]
```

[1.40e+01 4.30e+00 3.00e+00 1.10e+00 1.00e-01 1.00e+00]  
 [1.50e+01 5.80e+00 4.00e+00 1.20e+00 2.00e-01 1.00e+00]  
 [1.60e+01 5.70e+00 4.40e+00 1.50e+00 4.00e-01 1.00e+00]  
 [1.70e+01 5.40e+00 3.90e+00 1.30e+00 4.00e-01 1.00e+00]  
 [1.80e+01 5.10e+00 3.50e+00 1.40e+00 3.00e-01 1.00e+00]  
 [1.90e+01 5.70e+00 3.80e+00 1.70e+00 3.00e-01 1.00e+00]  
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 [2.30e+01 4.60e+00 3.60e+00 1.00e+00 2.00e-01 1.00e+00]  
 [2.40e+01 5.10e+00 3.30e+00 1.70e+00 5.00e-01 1.00e+00]  
 [2.50e+01 4.80e+00 3.40e+00 1.90e+00 2.00e-01 1.00e+00]  
 [2.60e+01 5.00e+00 3.00e+00 1.60e+00 2.00e-01 1.00e+00]  
 [2.70e+01 5.00e+00 3.40e+00 1.60e+00 4.00e-01 1.00e+00]  
 [2.80e+01 5.20e+00 3.50e+00 1.50e+00 2.00e-01 1.00e+00]  
 [2.90e+01 5.20e+00 3.40e+00 1.40e+00 2.00e-01 1.00e+00]  
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 [3.10e+01 4.80e+00 3.10e+00 1.60e+00 2.00e-01 1.00e+00]  
 [3.20e+01 5.40e+00 3.40e+00 1.50e+00 4.00e-01 1.00e+00]  
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 [3.70e+01 5.50e+00 3.50e+00 1.30e+00 2.00e-01 1.00e+00]  
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 [8.70e+01 6.70e+00 3.10e+00 4.70e+00 1.50e+00 2.00e+00]  
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 [9.20e+01 6.10e+00 3.00e+00 4.60e+00 1.40e+00 2.00e+00]  
 [9.30e+01 5.80e+00 2.60e+00 4.00e+00 1.20e+00 2.00e+00]  
 [9.40e+01 5.00e+00 2.30e+00 3.30e+00 1.00e+00 2.00e+00]  
 [9.50e+01 5.60e+00 2.70e+00 4.20e+00 1.30e+00 2.00e+00]  
 [9.60e+01 5.70e+00 3.00e+00 4.20e+00 1.20e+00 2.00e+00]  
 [9.70e+01 5.70e+00 2.90e+00 4.20e+00 1.30e+00 2.00e+00]  
 [9.80e+01 6.20e+00 2.90e+00 4.30e+00 1.30e+00 2.00e+00]  
 [9.90e+01 5.10e+00 2.50e+00 3.00e+00 1.10e+00 2.00e+00]  
 [1.00e+02 5.70e+00 2.80e+00 4.10e+00 1.30e+00 2.00e+00]  
 [1.01e+02 6.30e+00 3.30e+00 6.00e+00 2.50e+00 3.00e+00]  
 [1.02e+02 5.80e+00 2.70e+00 5.10e+00 1.90e+00 3.00e+00]  
 [1.03e+02 7.10e+00 3.00e+00 5.90e+00 2.10e+00 3.00e+00]  
 [1.04e+02 6.30e+00 2.90e+00 5.60e+00 1.80e+00 3.00e+00]  
 [1.05e+02 6.50e+00 3.00e+00 5.80e+00 2.20e+00 3.00e+00]  
 [1.06e+02 7.60e+00 3.00e+00 6.60e+00 2.10e+00 3.00e+00]  
 [1.07e+02 4.90e+00 2.50e+00 4.50e+00 1.70e+00 3.00e+00]  
 [1.08e+02 7.30e+00 2.90e+00 6.30e+00 1.80e+00 3.00e+00]  
 [1.09e+02 6.70e+00 2.50e+00 5.80e+00 1.80e+00 3.00e+00]

```

[1.10e+02 7.20e+00 3.60e+00 6.10e+00 2.50e+00 3.00e+00]
[1.11e+02 6.50e+00 3.20e+00 5.10e+00 2.00e+00 3.00e+00]
[1.12e+02 6.40e+00 2.70e+00 5.30e+00 1.90e+00 3.00e+00]
[1.13e+02 6.80e+00 3.00e+00 5.50e+00 2.10e+00 3.00e+00]
[1.14e+02 5.70e+00 2.50e+00 5.00e+00 2.00e+00 3.00e+00]
[1.15e+02 5.80e+00 2.80e+00 5.10e+00 2.40e+00 3.00e+00]
[1.16e+02 6.40e+00 3.20e+00 5.30e+00 2.30e+00 3.00e+00]
[1.17e+02 6.50e+00 3.00e+00 5.50e+00 1.80e+00 3.00e+00]
[1.18e+02 7.70e+00 3.80e+00 6.70e+00 2.20e+00 3.00e+00]
[1.19e+02 7.70e+00 2.60e+00 6.90e+00 2.30e+00 3.00e+00]
[1.20e+02 6.00e+00 2.20e+00 5.00e+00 1.50e+00 3.00e+00]
[1.21e+02 6.90e+00 3.20e+00 5.70e+00 2.30e+00 3.00e+00]
[1.22e+02 5.60e+00 2.80e+00 4.90e+00 2.00e+00 3.00e+00]
[1.23e+02 7.70e+00 2.80e+00 6.70e+00 2.00e+00 3.00e+00]
[1.24e+02 6.30e+00 2.70e+00 4.90e+00 1.80e+00 3.00e+00]
[1.25e+02 6.70e+00 3.30e+00 5.70e+00 2.10e+00 3.00e+00]
[1.26e+02 7.20e+00 3.20e+00 6.00e+00 1.80e+00 3.00e+00]
[1.27e+02 6.20e+00 2.80e+00 4.80e+00 1.80e+00 3.00e+00]
[1.28e+02 6.10e+00 3.00e+00 4.90e+00 1.80e+00 3.00e+00]
[1.29e+02 6.40e+00 2.80e+00 5.60e+00 2.10e+00 3.00e+00]
[1.30e+02 7.20e+00 3.00e+00 5.80e+00 1.60e+00 3.00e+00]
[1.31e+02 7.40e+00 2.80e+00 6.10e+00 1.90e+00 3.00e+00]
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[1.33e+02 6.40e+00 2.80e+00 5.60e+00 2.20e+00 3.00e+00]
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[1.37e+02 6.30e+00 3.40e+00 5.60e+00 2.40e+00 3.00e+00]
[1.38e+02 6.40e+00 3.10e+00 5.50e+00 1.80e+00 3.00e+00]
[1.39e+02 6.00e+00 3.00e+00 4.80e+00 1.80e+00 3.00e+00]
[1.40e+02 6.90e+00 3.10e+00 5.40e+00 2.10e+00 3.00e+00]
[1.41e+02 6.70e+00 3.10e+00 5.60e+00 2.40e+00 3.00e+00]
[1.42e+02 6.90e+00 3.10e+00 5.10e+00 2.30e+00 3.00e+00]
[1.43e+02 5.80e+00 2.70e+00 5.10e+00 1.90e+00 3.00e+00]
[1.44e+02 6.80e+00 3.20e+00 5.90e+00 2.30e+00 3.00e+00]
[1.45e+02 6.70e+00 3.30e+00 5.70e+00 2.50e+00 3.00e+00]
[1.46e+02 6.70e+00 3.00e+00 5.20e+00 2.30e+00 3.00e+00]
[1.47e+02 6.30e+00 2.50e+00 5.00e+00 1.90e+00 3.00e+00]
[1.48e+02 6.50e+00 3.00e+00 5.20e+00 2.00e+00 3.00e+00]
[1.49e+02 6.20e+00 3.40e+00 5.40e+00 2.30e+00 3.00e+00]
[1.50e+02 5.90e+00 3.00e+00 5.10e+00 1.80e+00 3.00e+00]]

```

Select and option

```
>> 2
```

Select 1 to query by row number or 2 to query by row name:

```
>> 1
```

Select the row number to query (indexes start in 0):

```
>> 150
```

The index number is invalid. Please try again.

```

Select the row number to query (indexes start in 0):
>> 149
[150.    5.9    3.    5.1    1.8    3. ]
Select and option
>> 2
Select 1 to query by row number or 2 to query by row name:
>> 2
Select the id to query:
>> 150
[150.    5.9    3.    5.1    1.8    3. ]
Select and option
>> 3
Indicate a column to include:
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
>> ishioah
The column indicated does not exit or has already been indicated. Please try again.
Indicate a column to include:
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
>> flower.id
Do you want to indicate another column? (Y/N)
>> y
Indicate a column to include:
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
>> sepal.length
Do you want to indicate another column? (Y/N)
>> Y
Indicate a column to include:
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
>> sepal.width
Do you want to indicate another column? (Y/N)
>> N
Showing the reduced dataset...
['flower.id', 'sepal.length', 'sepal.width']
[[ 1.    5.1    3.5]
 [ 2.    4.9    3. ]
 [ 3.    4.7    3.2]
 [ 4.    4.6    3.1]
 [ 5.    5.     3.6]
 [ 6.    5.4    3.9]
 [ 7.    4.6    3.4]
 [ 8.    5.     3.4]
 [ 9.    4.4    2.9]
 [10.    4.9    3.1]
 [11.    5.4    3.7]
 [12.    4.8    3.4]
 [13.    4.8    3. ]
 [14.    4.3    3. ]
 [15.    5.8    4. ]

```

[ 16.	5.7	4.4]
[ 17.	5.4	3.9]
[ 18.	5.1	3.5]
[ 19.	5.7	3.8]
[ 20.	5.1	3.8]
[ 21.	5.4	3.4]
[ 22.	5.1	3.7]
[ 23.	4.6	3.6]
[ 24.	5.1	3.3]
[ 25.	4.8	3.4]
[ 26.	5.	3. ]
[ 27.	5.	3.4]
[ 28.	5.2	3.5]
[ 29.	5.2	3.4]
[ 30.	4.7	3.2]
[ 31.	4.8	3.1]
[ 32.	5.4	3.4]
[ 33.	5.2	4.1]
[ 34.	5.5	4.2]
[ 35.	4.9	3.1]
[ 36.	5.	3.2]
[ 37.	5.5	3.5]
[ 38.	4.9	3.6]
[ 39.	4.4	3. ]
[ 40.	5.1	3.4]
[ 41.	5.	3.5]
[ 42.	4.5	2.3]
[ 43.	4.4	3.2]
[ 44.	5.	3.5]
[ 45.	5.1	3.8]
[ 46.	4.8	3. ]
[ 47.	5.1	3.8]
[ 48.	4.6	3.2]
[ 49.	5.3	3.7]
[ 50.	5.	3.3]
[ 51.	7.	3.2]
[ 52.	6.4	3.2]
[ 53.	6.9	3.1]
[ 54.	5.5	2.3]
[ 55.	6.5	2.8]
[ 56.	5.7	2.8]
[ 57.	6.3	3.3]
[ 58.	4.9	2.4]
[ 59.	6.6	2.9]
[ 60.	5.2	2.7]
[ 61.	5.	2. ]
[ 62.	5.9	3. ]
[ 63.	6.	2.2]

[ 64.	6.1	2.9]
[ 65.	5.6	2.9]
[ 66.	6.7	3.1]
[ 67.	5.6	3. ]
[ 68.	5.8	2.7]
[ 69.	6.2	2.2]
[ 70.	5.6	2.5]
[ 71.	5.9	3.2]
[ 72.	6.1	2.8]
[ 73.	6.3	2.5]
[ 74.	6.1	2.8]
[ 75.	6.4	2.9]
[ 76.	6.6	3. ]
[ 77.	6.8	2.8]
[ 78.	6.7	3. ]
[ 79.	6.	2.9]
[ 80.	5.7	2.6]
[ 81.	5.5	2.4]
[ 82.	5.5	2.4]
[ 83.	5.8	2.7]
[ 84.	6.	2.7]
[ 85.	5.4	3. ]
[ 86.	6.	3.4]
[ 87.	6.7	3.1]
[ 88.	6.3	2.3]
[ 89.	5.6	3. ]
[ 90.	5.5	2.5]
[ 91.	5.5	2.6]
[ 92.	6.1	3. ]
[ 93.	5.8	2.6]
[ 94.	5.	2.3]
[ 95.	5.6	2.7]
[ 96.	5.7	3. ]
[ 97.	5.7	2.9]
[ 98.	6.2	2.9]
[ 99.	5.1	2.5]
[100.	5.7	2.8]
[101.	6.3	3.3]
[102.	5.8	2.7]
[103.	7.1	3. ]
[104.	6.3	2.9]
[105.	6.5	3. ]
[106.	7.6	3. ]
[107.	4.9	2.5]
[108.	7.3	2.9]
[109.	6.7	2.5]
[110.	7.2	3.6]
[111.	6.5	3.2]



```

[112.    6.4    2.7]
[113.    6.8    3. ]
[114.    5.7    2.5]
[115.    5.8    2.8]
[116.    6.4    3.2]
[117.    6.5    3. ]
[118.    7.7    3.8]
[119.    7.7    2.6]
[120.     6.     2.2]
[121.    6.9    3.2]
[122.    5.6    2.8]
[123.    7.7    2.8]
[124.    6.3    2.7]
[125.    6.7    3.3]
[126.    7.2    3.2]
[127.    6.2    2.8]
[128.    6.1    3. ]
[129.    6.4    2.8]
[130.    7.2    3. ]
[131.    7.4    2.8]
[132.    7.9    3.8]
[133.    6.4    2.8]
[134.    6.3    2.8]
[135.    6.1    2.6]
[136.    7.7    3. ]
[137.    6.3    3.4]
[138.    6.4    3.1]
[139.     6.     3. ]
[140.    6.9    3.1]
[141.    6.7    3.1]
[142.    6.9    3.1]
[143.    5.8    2.7]
[144.    6.8    3.2]
[145.    6.7    3.3]
[146.    6.7    3. ]
[147.    6.3    2.5]
[148.    6.5    3. ]
[149.    6.2    3.4]
[150.    5.9    3. ]]

```

Select and option

```
>> 4
```

Select the variable to use as x axis:

```
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
```

```
>> sepal.width
```

Select the variable to use as y axis:

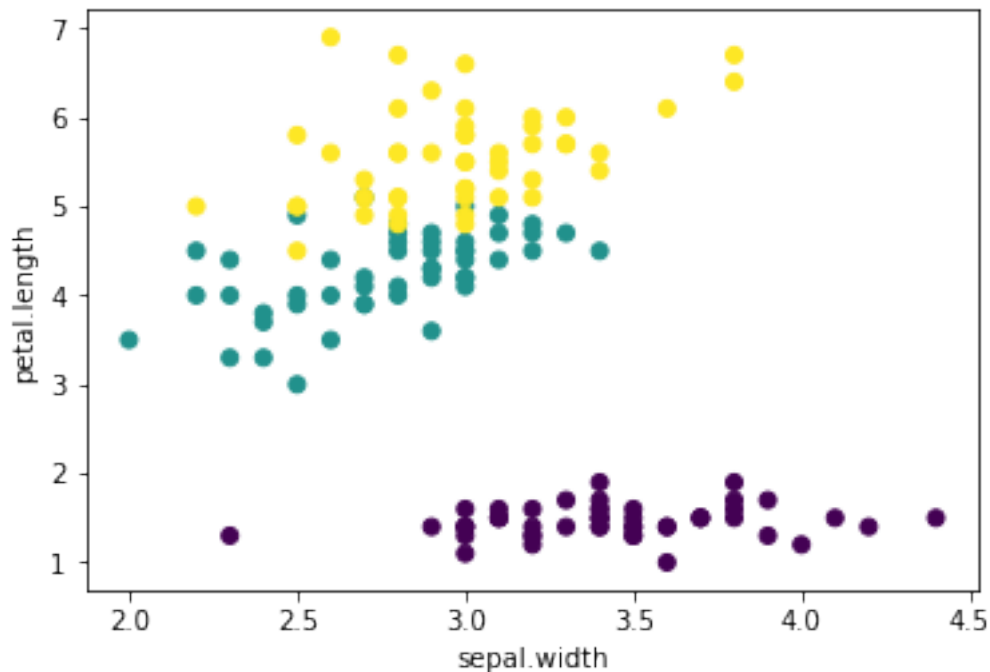
```
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']
```

```
>> petal.leng
```

The column does not exist. Please try again.

Select the variable to use as y axis:

```
['flower.id', 'sepal.length', 'sepal.width', 'petal.length', 'petal.width', 'variety']  
>> petal.length
```



Select and option

```
>> 5
```

## 1.4 Questions

Please answer the following questions to appraise your level of engagement with the content of the course. Use the Markdown cell corresponding to each question to write your answers.

1. Is there any other data structure or module in Python (besides *numpy*) which would allow you to import a *.csv* file in a more practical and manageable way? Use a code cell to support your answer.

**ANSWER:**

```
In [ ]: ## Use this cell to import your dataset with a data structure other than numpy
```

2. Using any of the two continuous variables of your dataset, using a cell code show an example of how a **linear regression** could be applied with your dataset to predict the values of future entries of data without target/class (you can implement linear regressions using existing Python modules). Moreover, discuss if there is any metric that can be used to decide which two variables are the most correlated.

**ANSWER:**

```
In [ ]: ## Use this cell to implement a linear regression between two variables
```