Assignment 9: Logistic Regression

General instructions:

- Use the file “assignment_9_template.py” to do the assignment. Change the name of the file to “assignment_9.py”.
- Write your code after the comment: “#Your code here:” (do not modify the code before this comment)
- Office hours information are available in the office hours channel on Teams.
- Authorized libraries (you cannot import other library than the authorized ones):
    - numpy
    - scikit-learn

Deadline:

- 08/12/2022 at 23:59:59
- Delayed submissions are not allowed

Coding instruction:

- The program is fed with three inputs. Input1, input2 and input3 are three lists. Input1 is the features, input2 is the list of labels and input3 is the features that you will use for prediction. Labels are classes (category). So input1, input2 and input3 will be a text with a list of items ("1,2,3,4" and “blue,blue,red,red“ and “5, 6, 9” for example). **Do not use the “input()” function**. Use input1, input2 and input3 as define in the template.
- Input1 is the feature, input2 is the label and input3 are the data you will have to predict the corresponding label.
- Your objective to make a logistic regression with the given lists:
    - Do not do any scaling or any train and test sets. Use the directly the list as given.
    - Create a LogisticRegression model with the sklearn.linear_model module.
    - Train the model.
    - Make the predictions and the probability of the prediction for the given list (input3).
    - Use the given sentence to display the predictions.
- In all tests there are always only two different classes in the list of labels.
- The function to transform the input strings into lists is already written in the template.
- **The function to print the result is already written in the template**. You have to use this exact function where:
    - feature_predict is the list of features given for prediction (=input3)
    - predictions is the list of predictions made by your model with the feature_predict.
    - Predictions_proba is the list a probability of each classes for each predictions (shape looks like [[0.2, 0.8], [0.5, 0.5], [0.6, 0.4]…..], it has two items per predictions, we take the maximum one).

Tests Information:

Test1:

Input1 (string)	**Input2** (string)	**Input3** (string)
"1,2,3,4,5,6"	"blue,blue,blue,red,red,red"	"3,4,6"

Expected output (string):

```
For a feature egal to 3, the most probable result is blue with a probability of 0.64.
For a feature egal to 4, the most probable result is red with a probability of 0.64.
For a feature egal to 6, the most probable result is red with a probability of 0.94.
```

Test2:

Input1 (string)	**Input2** (string)	**Input3** (string)
"-20,51,54,54,6,645,564"	"a,b,b,b,a,a,b"	"0,1,2,3"

Expected output (string):

```
For a feature egal to 0, the most probable result is b with a probability of 0.59.
For a feature egal to 1, the most probable result is b with a probability of 0.59.
For a feature egal to 2, the most probable result is b with a probability of 0.59.
For a feature egal to 3, the most probable result is b with a probability of 0.59.
```

Test3:

Input1 (string)	**Input2** (string – one line)	**Input3** (string)
"1,-6,9,10,-9,-100,10,25,-52,36"	"positive,negative,positive,positive,negative,negative,positive,positive,negative,positive"	"200,-20,56,-80"

Expected output (string):

```
For a feature egal to 200, the most probable result is positive with a probability of 1.00.
For a feature egal to -20, the most probable result is negative with a probability of 1.00.
For a feature egal to 56, the most probable result is positive with a probability of 1.00.
For a feature egal to -80, the most probable result is negative with a probability of 1.00.
```

Upload instructions:

- When your code is finish and work. Upload it to codepost.io (Tutorial here)
- You can reupload your code as many times as you want until the deadline
- The last upload is taken into account, so if you success all tests but reupload another file which is not working, you assignment will be failed.
- The expected name for your file is “assignment_9.py”. If the name is different, your code will fail.