**Practice #9: Machine Learning I**

**Objectives:**

* + Make some linear and polynomial regression in excel
  + Get use to numpy array

**Steps:**

1. **Study the data**

*In this step, you will study the given data.*

* Open a copy of the given excel file.
* Draw a scatter graph where: label = f(feature)
* Which kind of regression will be the more adapted?

1. **Make a linear regression**

*In this step, you will do your first linear regression in excel.*

* With the following model: y’ = w1\*x, choose randomly a variable w1 and make a column where you use your model to make prediction.
* Draw your model predictions on the same graph than label = f(feature).
* Adjust the weight w1 to improve your predictions.
* Make a column with the squared loss, the function is:
* In a cell, display the mean squared loss.
* What is the lowest mean squared loss obtained?

1. **Make a polynomial regression**

*In this step, you will do your first polynomial regression in excel.*

* With the following model: y’ = w1\*x + w2\*x^2, choose randomly a variable w1 and w2 and make a new column where you use your model to make prediction.
* Draw your model predictions on the same graph than label = f(feature) and the linear regression.
* Adjust the weight w1 and w2 to improve your predictions.
* Make a column with the squared loss, the function is:
* In a cell, display the mean squared loss.
* What is the lowest mean squared loss obtained? Is it better than with the linear regression model?

1. **Getting use to numpy array**

*In this step, you will use and modify some numpy array.*

* Create two numpy arrays:

|  |  |
| --- | --- |
| **X1** | **Y** |
| 2,7 | 22 |
| 6,6 | 92 |
| 1,8 | 9 |
| 7,9 | 203 |
| 8,1 | 176 |
| 0,4 | 5 |
| 2,3 | 21 |
| 4,3 | 67 |
| 2 | 16 |
| 6,9 | 137 |
| 0,8 | 11 |
| 7,2 | 116 |
| 9,5 | 341 |
| 5,5 | 89 |

* Transform them into one column with the .reshape() function (final shape should be (14,1))
* Create two other arrays:
  + X2: which is the square of every item of X1
  + X3: which is every item of X1 power 3
* Print the four arrays