**4. Using SVM and NN Tools** *Theodoros*

The goal of this task is to apply different classification approaches to a challenging dataset to compare the results, to enhance the accuracy of the learnt models via selecting better parameters/preprocessing/using kernels/incorporating background knowledge and to summarize your findings in a report. For this problem, we will use the [UCI Machine Learning Repository](http://archive.ics.uci.edu/ml/index.php) and particularily the [Heart failure clinical records](https://archive.ics.uci.edu/ml/datasets/Heart+failure+clinical+records) dataset. This is a classification problem. The goal of this task is to learn binary classification models that distinguish the two classes (in this case mortality event or not). Please read carefully the dataset description on the UCI website as it gives information about the different attributes.

As far as classification algorithms are concerned, we will use:

1. Neural Networks (Multi Layer Perceptron – MLP)

2. Support Vector Machines.

You will use 2 “variations” of each approach:

* For the SVM, you should use 2 different kernels (any kernel is fine, you can use the linear kernel as one kernel)
* For the MLP, you should use two of the following activation functions: 1. Logistic/sigmoid 2. Tanh and 3. Relu

Accuracy of the four classification algorithms, you compare, should be measured using 10-fold cross validation. In your report after comparing the experimental results, write a paragraph or two trying to explain/speculate why, in your opinion one classification algorithm outperformed the other. Finally, at the end of your report write two paragraphs which summarize the most important findings of this task.

**Deliverables:**

Please submit both the report and the source code file.

**Suggestions:**

You can use built-in functions in python and R.

For python, it’s preferable to use Scikit-Learn for both SVM and MLP (see the scikit-learn documentation).

For R, we suggest the ‘mlp’ and ‘svm’ functions.