Assignment 3

Due: Tue, Nov 24, 23h59, by email to `jaime.cardoso@fe.up.pt`

1. From the Class Exercises, Set 4, solve group 4 (started in the class).

2. Suppose you know the model that explains your data is as following $y = \sum_{i=1}^{D} w_i g_i(x_i)$. D is dimension of the input space, x_i represent each of the features, g_i is a function of the i-feature only. You want a multilayer perceptron neural network to fit the data. Draw a suitable architecture for your neural network.

3. Consider SVMs applied to a generic binary classification problem. What's the difference in the solutions obtained with kernel $k_1(x_1; x_2)$ and $k_2(x_1; x_2) = 1 + k_1(x_1; x_2)$? Starting from the dual formulation, prove that difference.

4. Implement a multiclass SVM based on DAGs for 5 classes (the code does not need to be generic for any number of classes). As binary SVM you can use any standard toolbox, as libsvm or Matlab's implementation in Bioinformatics Toolbox. Start from the code provided in trab-DAG.zip (you may need to update libsvm toolbox for your system).