ICT for Health
Laboratory # 7
Arrhythmia with Neural Networks and SVM

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Dataset

- Use the same dataset you used in Lab #6.

Lab description - binary classification

- Consider the case of binary decision (class 0 for healthy patients and class 1 for patients with arrhythmia, whatever is the severity)
- Use TensorFlow to design a Neural Network with F input nodes, $\lfloor F/2 \rfloor$ nodes in the hidden layer, one output node; sigmoid activation functions
- Use the cross-entropy objective function, choose the learning coefficient for the gradient algorithm and the number of iterations and explain your choice in the report
- Being N the total number of patients, use $\lfloor N/2 \rfloor$ patients for training and the remaining patients for testing.
- Measure the specificity and sensitivity for both the training and the testing dataset

Lab description - 16 classes

- Convert the vector $N \times 1$ with the 16 classes given by the medical doctor into the matrix $N \times 16$ with values 0 or 1. Actually not all the classes appear in the dataset: decide what to do.
- Use TensorFlow to design a Neural Network with F input nodes, $\lfloor F/2 \rfloor$ nodes in the hidden layer, softmax output node; sigmoid activation functions in the nodes
- Use the cross-entropy objective function
- Being N the total number of patients, use $\lfloor N/2 \rfloor$ patients for training and the remaining patients for testing.
- Measure the confusion matrix for both the training and the testing dataset

SVM - Support Vector Machine

- Use SVM (the original one, that finds the hyperplane that separates the two classes) of Scikit-Learn to solve the binary case, $\lfloor N/2 \rfloor$ patients for training and the remaining for testing. Choose the box constraint and justify your choice in the report.
- Before applying SVM, pre-process the data using PCA.

Report

- Write one report for labs 6 (Bayesian classification) and 7 (Neural Networks and SVM)