

# Chapter 7

## Conclusions

During this research it has been noticed, that these machine learning algorithms are a great tool, which help researchers in the resolution of many problems. Specifically the Artificial Neural Networks which have been focused upon. They are a particular kind of machine learning algorithms based on biological theories. From a random state, they learn from a set of patterns, how to make predictions of a particular feature within this set. In this case this feature was the Systolic Blood Pressure.

Before starting to proceed to train the network, preprocessing tasks were needed. Here two algorithms were used: Principal Component Analysis and Wrappers, where Wrappers have been demonstrated to be better.

It does not mean that the PCA is not a good tool, but as regards to how they work, they select the features which provide more information. It is normal, that most of the parameters selected by this method were Pulse Transit Time variables, because they are the most important input features, but this involves having much redundant data and this could cause a bad performance in the ANN.

On the other hand, with the wrappers method much better results were obtained, but at a higher computational cost.

After the pre processing tasks, it was time to select the most adequate configurations of ANN. It is important to mention, that it is not easy to find the most adequate configuration of an ANN, due to the infinite number of available possibilities, but it has been very helpful to use Genetic Algorithms, a tool based on the evolutionary theories, to find the most suitable configuration.

In Chapter 5 it was proved, that working with GAs made it possible to find optimal configurations for this ANN and also to focus on different performance procedures: concerning Standard Deviation, Mean Absolut Error, minimizing the number of input features or the number of input patterns,etc...

Once the configurations were selected, the different ANNs were trained with normal learning procedures and also with GAs again, the results obtained in Chapter 6 have demonstrated, that the ANN's are a very powerful tool in the pattern recognition process.

It is true that the ANN does not provide any internal information about how they compute the output, as the decision trees do. This information could help the researchers to discover which input parameters could be rejected. Anyway, the preprocessing tasks, which have been carried out, wrappers and PCA, are intended to be great tools in this task, as it has been already been proven. In any case, the designed ANN's were robust generalizators.

Finally the GAs cooperating with the ANNs are a powerful technique capable of solving any estimation problem in a competent way. In future research directions it may be proved that the resulting ANNs with these GAs are better generalizators than with common learning algorithms, by testing with datasets obtained from different patients.