

## Assignment 1

Your assignment is to create an ANN with Backpropagation as a learning algorithm to predict if the different cases contain signs of diabetic retinopathy or not. You need to use 75% of the examples as the training set, 10% as the validation set and the rest (15%) as the testing set.

The data set can be found in the file 'assignment1.txt'. This data set is formed by 1150 examples (one per line inside the document). Each of these lines has 19 input parameters, all of them numerical values, and one value representing the two different classes (the last value).

Information about the attributes:

- 0) The binary result of quality assessment. 0 = bad quality 1 = sufficient quality.
- 1) The binary result of pre-screening, where 1 indicates severe retinal abnormality and 0 its lack.
- 2-7) The results of MA detection. Each feature value stand for the number of MAs found at the confidence levels  $\alpha = 0.5, \dots, 1$ , respectively.
- 8-15) contain the same information as 2-7) for exudates. However, as exudates are represented by a set of points rather than the number of pixels constructing the lesions, these features are normalized by dividing the number of lesions with the diameter of the ROI to compensate different image sizes.
- 16) The euclidean distance of the center of the macula and the center of the optic disc to provide important information regarding the patient's condition. This feature is also normalized with the diameter of the ROI.
- 17) The diameter of the optic disc.
- 18) The binary result of the AM/FM-based classification.
- 19) Class = {0,1}

Your report has to cover the key parts as follow:

1. Give the structure of your ANN.
2. Give the equations that you used to update the weights explaining all the parameters on them.
3. Give a figure showing how the validation accuracy is changing during the training process.
4. Give the percentage of correctness of the total testing data set and give the percentage of correctness of the two different classes in the testing set.

Before submitting the report, you should present this assignment first to Miguel Leon. After that, and only if everything is correct, you are able to send the report to [Miguel.leonortiz@mdh.se](mailto:Miguel.leonortiz@mdh.se)