

[Lab] Feedforward Neural Network (FFNN)

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Lab due: Before the end of today lab session

Evaluation: Code and explanation about the code in groups of only two or three people

Remark:

- Only groups of two or three people accepted (preferably three).
 - Before you leave today lab session, you must show the lab task results to the professor.
 - No plagiarism. If plagiarism happens, both the “lender” and the “borrower” will have a zero.
 - Code yourself from scratch **following the theory explained during lecture**. No Pre-lab/Lab will be considered if any ML library is used.
 - Do thoroughly all the demanded tasks.
 - Study the theory for the questions.
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1 Task

1. Download the data stored in the file `data_ffnn_3classes.txt` available on the course website to the folder where your working Python script is located. This dataset consists of three columns: x_1 , x_2 and y . Notice that this is a multi-class problem (in particular 3 classes).
2. Download the Python script that is available on the course website to the same folder where the data file is located. It is important that you start from the provided Python script.
3. Implement the forward propagation and back propagation of the above FFNN with the purpose to optimize the model parameters. Repeat this until convergence. That is, train your model to learn how to solve the above multi-classification problem.
4. Show that your algorithm converges by illustrating the error reduction at each iteration.
5. What are the optimal parameter values for the hidden layer (V) and for the output layer (W)?
6. Show that your classifier works properly by comparing the predicted output values to the actual training output values.
7. Test your optimized model by doing forward propagation over the following test data set: $(x_1, x_2)=(2, 2)$, $(x_1, x_2)=(4, 4)$, and $(x_1, x_2)=(4.5, 1.5)$.

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