Faculty of Engineering
Alexandria University

SSP
December 2017

Optimization Mini-Project

You should prepare a report on artificial neural networks (ANNs) covering the following points:

- **What are ANNs?**
- **The basic components of an artificial neuron model.**
- **Examples of activation functions.**
- **Types of neural networks.**
- **Detailed explanation of the back-propagation training algorithm for feed-forward ANNs, especially the derivation of the weights update equations.**
- **Modes of training.**
- **Applications of ANNs, for example, as in universal function approximation and as classifiers.**

You should implement the back-propagation algorithm and test your algorithm by training it to learn the function $e^{-(x^2+y^2)}$. To check the correctness of your implementation, you may use NN toolbox in MATLAB and compare the results.

Regulations

1- You should work in groups of 3 students, as a maximum limit.

2- You should prepare a report that is well-formatted including all requirements.

3- A bonus task: Train ANN to distinguish the voice of a person using a suitable feature vector, or any other identification/classification task.

4- Another bonus task is to use an alternative to gradient descent in the training algorithm.

5- Deadline for submission is Sunday 13/5/2018 and earlier submissions are welcome to receive a bonus mark