

Mechatronics Engineering and Automation Program

CSE488: Computational Intelligence

Project #01: Implementing and Training Neural Network



Objectives:

Neural Networks is one of the machine learning techniques that is widely used in tasks like classification. In this project, students will create and train a neural network from scratch and use it to classify whether a patient has a heart disease or not given information about the patient.

Description:

In this project, we will use the fully connected neural network as classifier. Using the concepts of feedforward and back propagation explained in the lectures it is required to design and train a neural network to classify heart disease patients.

- Import the dataset, divide it randomly to 70% training data and 30% testing data.
- Implement a function that creates a neural network with two hidden layers, the number of neurons in each layer should be provided as an input to the function. Choose appropriate data structure to represent the network.
- Use the above function to create networks with different number of neurons in the hidden layers. (i.e. [5, 10, 20, 50, 100])
- Implement a function to apply back propagation and gradient descent to train the neural network given a training dataset.
- Train the network created using ready-made optimization function provided by Sci-py.
- Compare the results of different size networks. Plot the relation between the number of neurons in the hidden layer and the accuracy of the network.
- Compare the results of networks trained by the ready-made function and the your implemented function.

About the Cleveland heart disease dataset:

The dataset records 13 attributes upon which the machine learning algorithm should predict the presence of a heart disease or not. The attributes contain values like: age, sex, resting blood pressure, etc. The "**target**" field refers to the presence of heart disease in the patient. It is integer valued from 0 (no presence) and 1 for the presence of heart disease.

important: You need to write a neat report with the following contents:

- Problem definition and importance (1 Page).
- Methods and Algorithms (2-3 Pages).
- Experimental Results and discussions.
- Appendix with codes.

Warnings: (1) Plagiarism is prohibited. (2) Assignments with no reports and or no presentations will not be graded.