**Programming Assignment-4 A Two-Layer ANN[[1]](#footnote-1)**

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**Introduction**

In this programming assignment, you will build an artificial neural network with a hidden layer. You will implement backward propagation algorithm and apply it to the given data set.

**Plot the training data**

Please refer to the file “dataplot.ipynb” for how to plot training data. By visualizing the data, you can see that the data is not linearly separable.

A screenshot of a cell phone

Description automatically generated

**Part-I: Logistic Regression**

Use the logistic regression model you have built in your programming assignment-3 to classify the given data. What is the classification accuracy? Accuracy is 47%

A screenshot of a cell phone

Description automatically generated

**Part-II: Two layer artificial neural network**

In this part of the assignment, you will implement an artificial neural network with a hidden layer.

**Steps:**

1. Define the artificial neural network structure (# of input units and # of hidden units, as we only have one hidden layer).

2. Initialize the network’s parameters

3. Iterations:

- Implement forward propagation

- Compute cost function

- Implement backward propagation to get the gradients

- Update parameters (gradient descent)

Question 1: What is your network structure, i.e., the number of input units, the number of hidden units, and the number of output units?

A close up of a map

Description automatically generated

Question 2: Can we initialize all weights including the b’s to 0? Why?

A close up of a person

Description automatically generated

Question 3: According to the steps outlined above, is this batch gradient descent or stochastic gradient descent? Why?

Stochastic. The reason is to overcome local minima

Question 4: what’s the classification accuracy?

**Submission:**

* **Rule1:**
  + If you work with a partner, please name your zipped file as follows:

PA4\_LNAME1\_LNAME2.Zip for folder and PA4\_LNAME1\_LNAME2.docx for a word document, i.e., the file names should include both LAST NAMEs.

* + If you work on your own, the format should be

PA4\_LNAME.Zip for folder and PA4\_LNAME.docx for a word document.

* **Rule2:**
  + Put your FULL names whether working in a group or individual in the word document that answers all the questions.
* **Rule3:**
  + **EVERYONE** in the class should submit this Assignment, which should provide all files (like test excel files etc.. ) that are necessary for the execution of code in the submission folder.
* **Rule4:**
  + Please submit two Jupyter files, each of which is corresponding to Part I and Part II, respectively.

1. Data is obtained from Dr. Andrew Ng’s Machine Learning course. [↑](#footnote-ref-1)