

**CS349 - ARTIFICIAL INTELLIGENCE II**  
**ASSIGNMENT-3: PERCEPTRON**

**(Read all the instructions carefully & adhere to them.)**

**Date: 25 October 2023**

**Deadline: 3 November 2023**

**Total Credit: 20**

**Instructions:**

1. The assignment should be completed and uploaded by 29 October 2023, 11:59 PM IST.
2. Markings will be based on the correctness and soundness of the outputs. Marks will be deducted in case of plagiarism.
3. Proper indentation and appropriate comments are mandatory.
4. Make proper documentation of all results and observations with their analysis.
5. You are supposed to make a group of at most three members.
6. You should zip all the required files and name the zip file as roll\_no\_of\_all\_group\_members .zip, e.g., 2101ai01\_2102ai02\_2101ai03.zip.
7. Upload your assignment (the zip file) in the google classroom with the class code: jtuplux
8. Course Webpage: <https://ai-nlp-ml-iitp.github.io/ai-cs349/>
9. For any queries regarding this assignment, you can contact:  
Priyanshu Priya ([priyanshu528priya@gmail.com](mailto:priyanshu528priya@gmail.com)) or  
Manisha Boorja ([manishaboorja@gmail.com](mailto:manishaboorja@gmail.com))

**Questions:**

1. Implement NAND logic gate with 2-bit binary input using perceptron algorithm.
2. Explain the fundamental steps and key components required to create a perceptron from scratch, and implement it without relying on pre-built libraries or frameworks?
3. Access the dataset here :<https://archive.ics.uci.edu/dataset/53/iris>  
Short description: This data set contains a set of 150 samples, which consists of 50 samples from each of three species of Iris: setosa (label 0), versicolor (label 1), and virginica (label 2). Each sample was measured in four features: sepal length, sepal width, petal length, and petal width.
  - Data Preparation and Visualization: Split the data set into a balanced (with respect to the labels) training and test set, containing respectively 80% and 20% of the data set.

- Visualize the first two features of the training set, i.e., sepal length and sepal width, and their corresponding labels/classes.
- Now consider only the data set containing two classes: setosa and versicolor, Classify the data into two classes with the Perceptron.
- Report the training and test errors. Comment.

Prepare a document for each question (1 to 3) detailing every step on how you reached the end result and comment on each line of code . Plagiarism of codes is strictly not allowed.

**Note:**

- I. You cannot use any existing libraries to implement the perceptron.
- II. See the lectures to get an idea about how the perceptron needs to be implemented.