# CS 214: Artificial Intelligence Lab

**Common Instructions**: You have to submit a code without any syntax errors. Don't copy from others; write your own piece of code with comments as much as possible. Try to Run with the test cases before submitting the code.

## Assignment 6

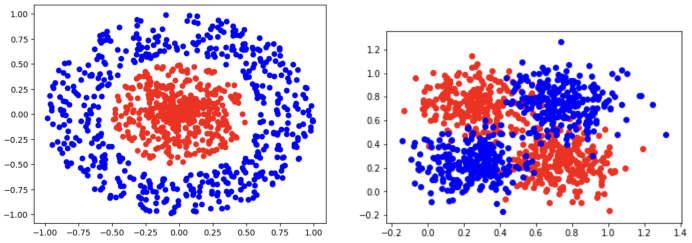
## NOTE:

- Test your code and submit it on Moodle (`https://moodle.iitdh.ac.in/user/index.php?id=992`).
- Deadline for submission is **Sunday 24 March by (11:59 PM)**
- We will run a plagiarism check for all the submissions; if found, a penalty will be applied

### Lab Instructions:

1. In this assignment, you need to implement the back-propagation algorithm discussed in class. Go through the Google Colab file backpropagation.ipynb: `https://colab.research.google.com/drive/1AzD7HB2xLQiOwiIEgBRoJ6lvx8bNtBoT?usp=sharing` with all accessory codes to generate datasets and helper functions. Follow the comments and fill in all dotted lines (#.....) in the **forward_propagation** and **back_propagation** functions and in the **training block**.

   - Create a different Colab file for your group and rename it as **backpropagation_groupno.ipynb** and submit in the zip file *(any violation in naming will lead to skipping your group's evaluation).*
   - Do not modify any other function in the file except the ones we ask you to modify.
   - **Do not make any change in the provided Colab file**
   - You are given two no-linearly separable datasets here. You need to visualize the generated datasets (providing the reference picture)



   - Fill in the *forward_propagation* function to get the output of all layers.
   - With the provided cross-entropy loss function, understand the steps of *back_propagation* and implement it.
   - Train your network to get the optimal loss. Follow the gradient descent update rule to fill in the code for training. Visualize the progress of loss through iterations.
   - Visualize the weights at each step: initialization, after training, and the decision boundary.
   - Implement the same on the second XOR pattern dataset and visualize the decision boundary.