

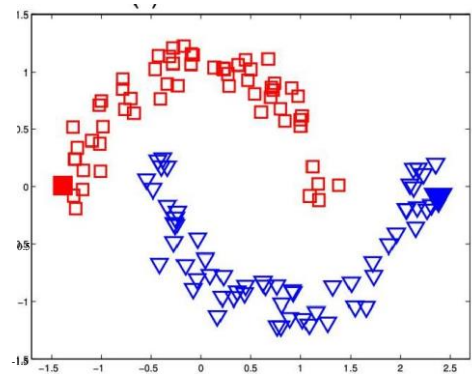
Graph Mining CSF426  
Lab session 4  
Time: 2 pm - 4 pm  
Date: Sept 9, 2023

Instructions: All questions need to be answered. You are required to write programs in jupyter notebook and submit .ipynb and pdf conversion both on canvas. For theoretical questions, you can type answers in the jupyter notebook itself. You are free to choose any library package (unless you are explicitly asked to implement a module) in python for the implementation of the programs. Class notes support is allowed during lab sessions.

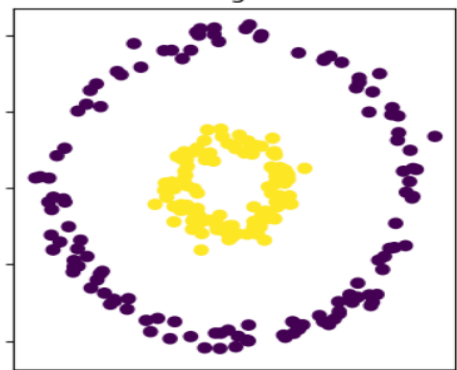
[Total Marks = 10]

Q1. Design a program to draw the data shown in the pictures a and b. **Use of direct inbuilt library functions to generate data points is not allowed.**

- a) Hint: for upper half  $(0, \pi)$  using:  
 $\text{math.cos}(\theta)$ ,  $\text{math.sin}(\theta)$  and class (1, 0)  
for bottom half  $(-\pi, 0)$  using:  
 $\text{math.cos}(\theta)$ ,  $\text{math.sin}(\theta)$  and class (0, 1)



- b) Draw the data points such that all the points on the exterior circle fall in one class, whereas the points on the interior circle should belong to another class. Hint:  $(0, 2 * \pi)$  using:  
 $\text{math.cos}(\theta)$ ,  $\text{math.sin}(\theta)$  on different radius. You are free to choose any value of radii.



Q2. Write a program to transform the given datapoints generated in **part b** of the previous question into a graph such that the datapoints in outer circle are connected to the inner circle datapoints. Datapoints inside the same circle cannot be connected by an edge. Additionally, multiple data points from the outer circle can be connected to the same data point from the inner circle.

Hint: Use Euclidean distance-based metric to determine the distance between each datapoint in the outer circle and those in the interior circle.