Assignment # 1
(CLO1 -> PLO1)
Digital Image Processing
Image Segmentation and Objects Analysis Based on Connected Component Labeling
Submission Deadline: 18th Apr 2021

Note: Students should score 40% in OBE specific questions to ensure their accumulated scores towards respective PLOs are above 40%

Connected component analysis is used for detailed study of different objects given in an image. It can also be used for segmentation and extraction of some fruitful information from corresponding color or gray image. Similar objects can also be grouped using connected component analysis. Using CCA, image segmentation can be performed with the ability to keep only those objects that we are interested in. In this assignment, you will achieve this end goal by employing a number of steps on fundus images. Fundus images are digital images of human retinal which are used to diagnose different retinal diseases. You are given a set of 50 fundus images on which you have to evaluate your designed algorithms. The images for this assignment can be accessed using following link

https://drive.google.com/drive/folders/1857HBX8S5beiZA9Xx646wkvRVTgC64LX?usp=sharing

You have to perform following steps on given

STEP 1 (Design V Set): The first thing needed for CCA is the design **V set**. Such a set contains all possible grayscale values that can belong to an object that we want to segment out or the background. You can do this through manual investigation of all images given for this assignment nd come up with an ideal V set. An example image is shown here. You have the choice to keep the image in 3-channel (RGB) or convert it to grayscale.
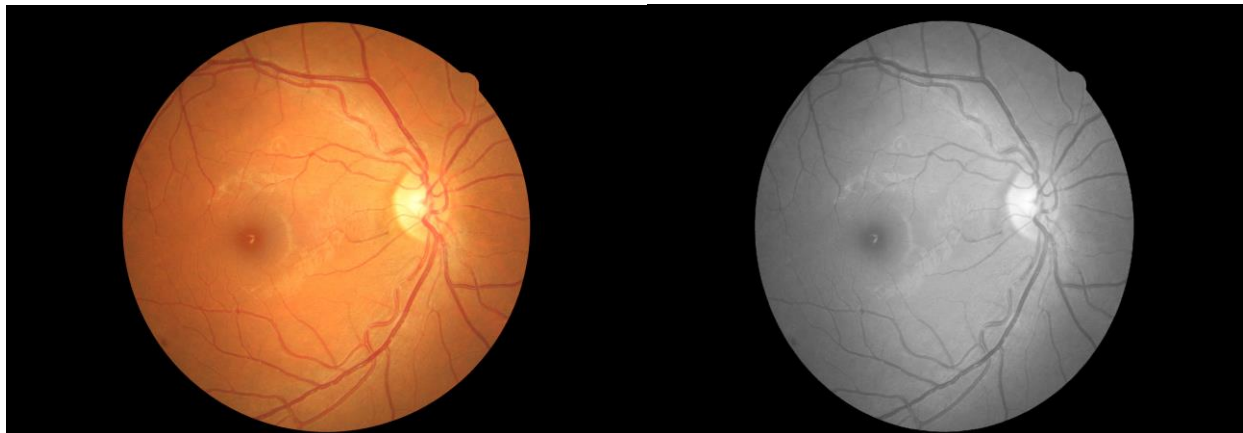

STEP 2 (Image labelling using 8-conenctivity and Step-1 V set): Once the **V set** has been decided, it can be used to run the CCA on the images. The CCA would result in several detected objects in the image. Each object will differ in size. Expected outputs can be as follows (which can be modified to have different objects represented by different colors):
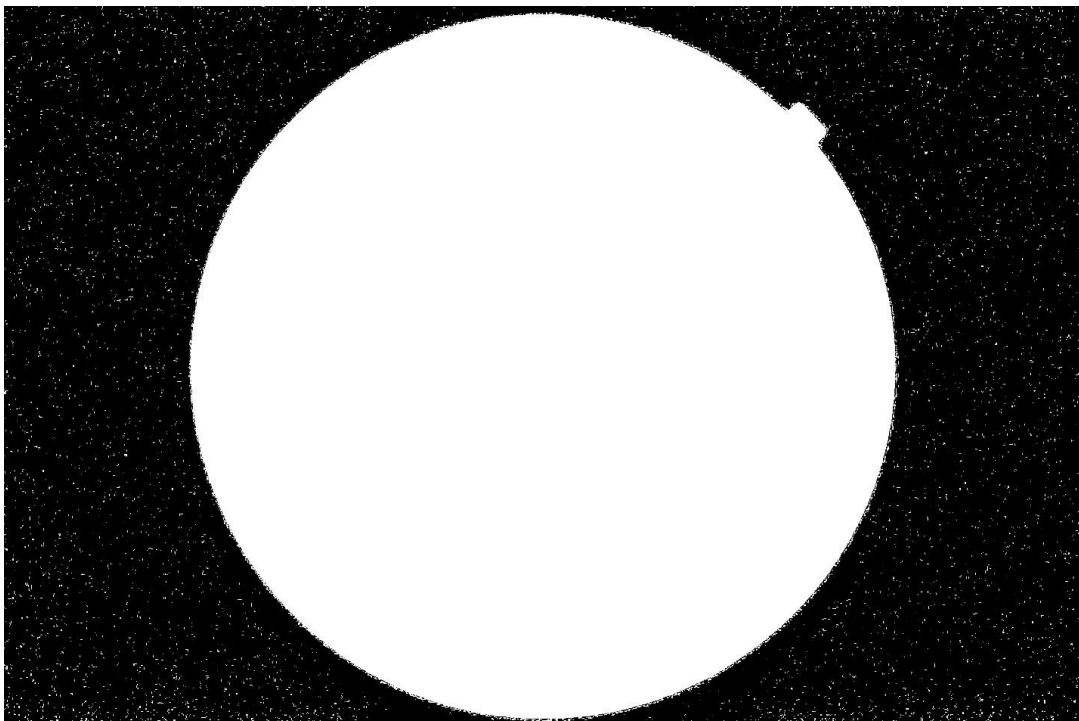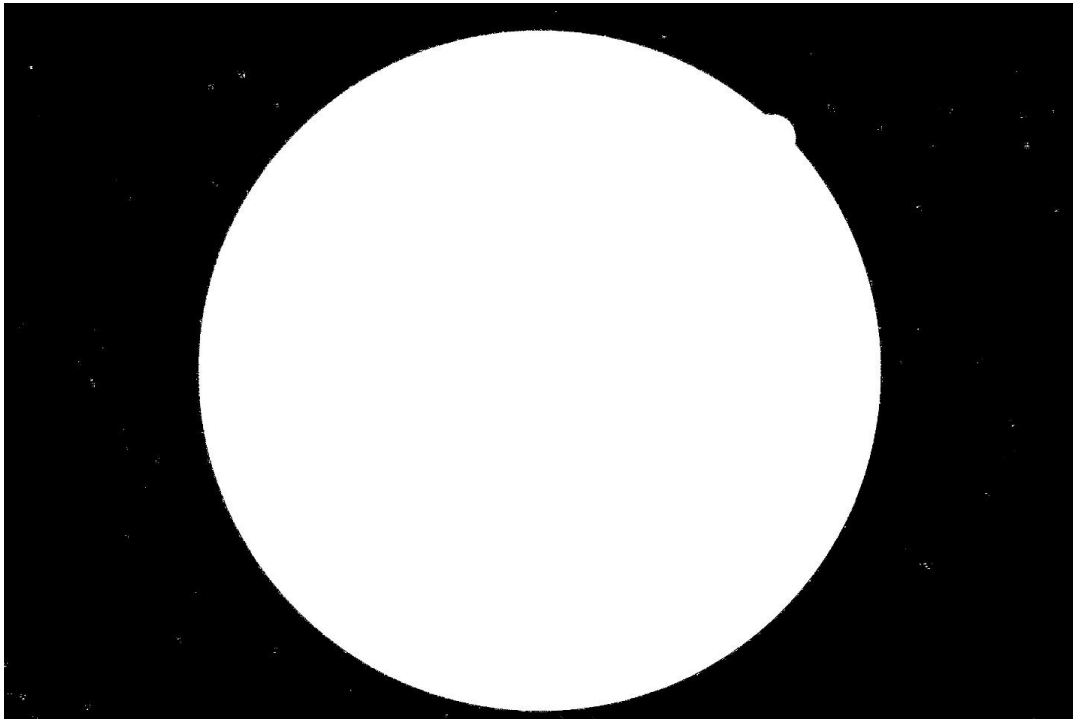
STEP 3 (Object refinement and calculating bounding box): Using the information of the size, the biggest object can be identified in the image. In the third step, you have to first keep the biggest object only and then draw a bounding box around the biggest object in the image. Bounding box

is based on left and right most columns as well as top an bottom most rows as shown below. Crop image based on bounding box and save final image (as shown below).
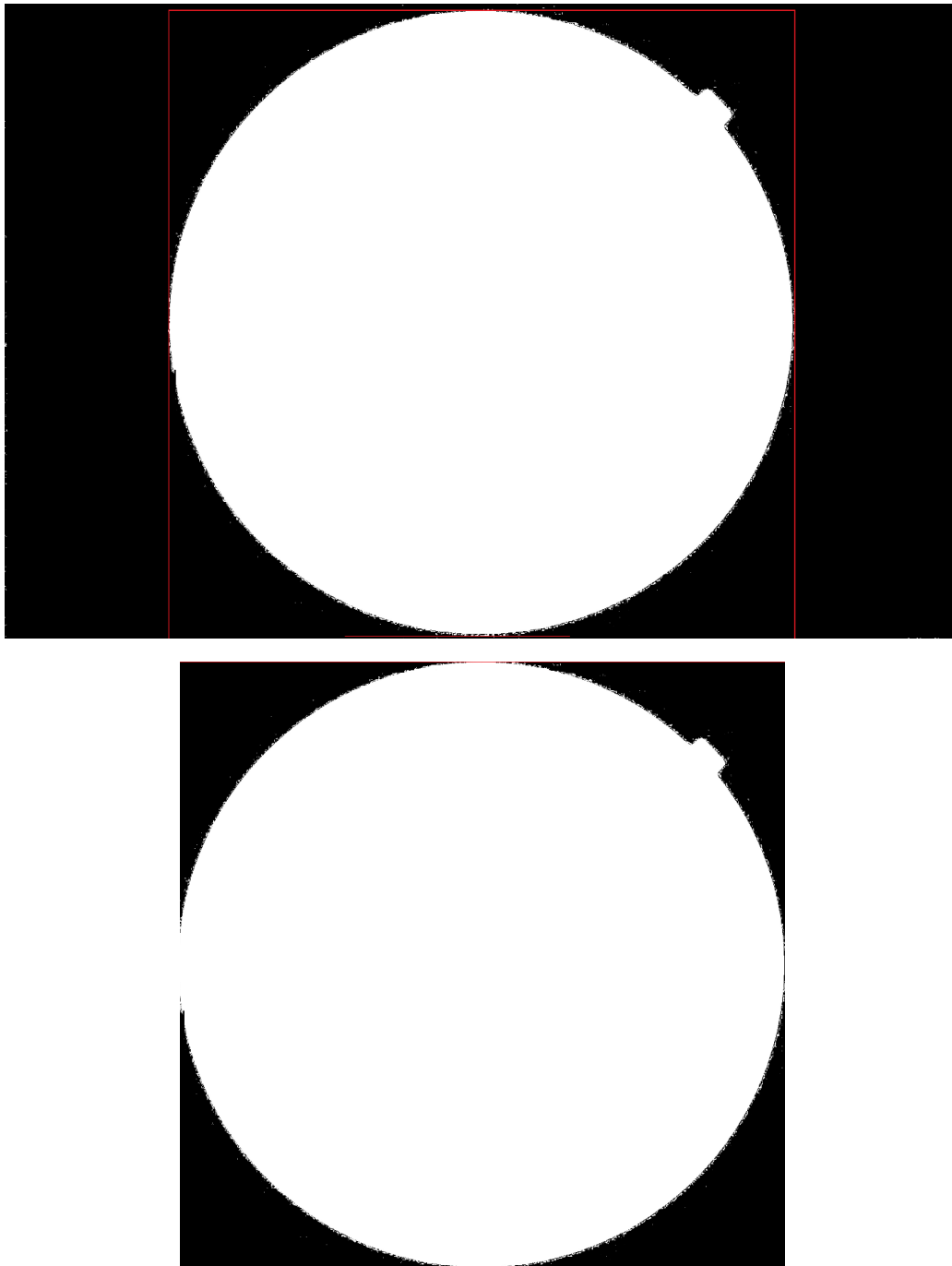
Submission: You need to submit a report (word or pdf) against this assignment containing

1. Explain you working by clearly giving V set, which steps you followed for steps 2 and 3. You can make a flow diagram fro better explanation.
2. Copy complete editable code in a word file
3. Add all 50 images along with their intermediate and final outputs in a tabular form