Assignment 3 for CSF3543 – Digital Image Processing

This group assignment should be carried out by at 2 students in a group. It should be highlighted that the total assignments (Assignment 1, 2 & 3) contributes to 40 percent of total marks given in this course. This Assignment 3 contributes to 20% of the total 40% assignment marks. The proportion of the marks are as follows:

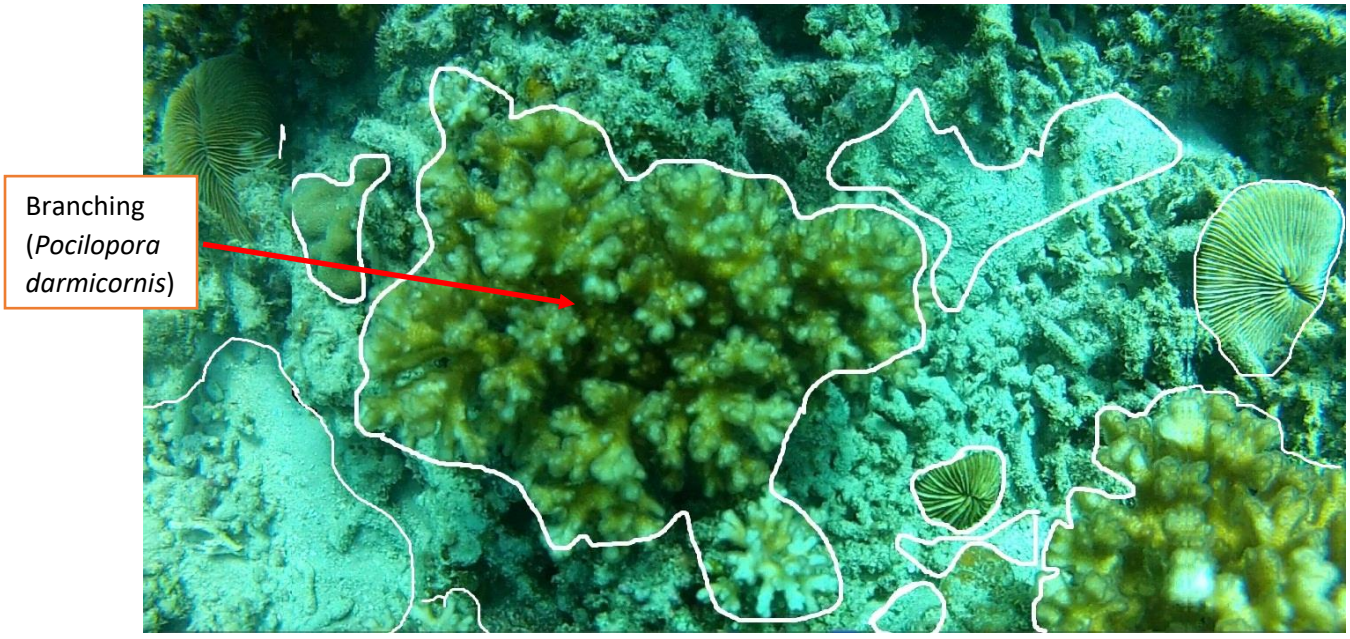
1. Project report – Problem Solving - 10%
2. Project report – Written Communication - 10%
3. Presentation – Oral Presentation (YouTube Video) - 10%
4. Presentation – Problem Solving (YouTube Video) - 10%

Case Study:

Coral reefs exist in many different types. Coral reefs are important because they protect our shorelines and provides habitats for marine life ecosystems. Marine scientists normally have to carry out coral reef population survey to estimate the population of coral reefs. Normally, this population estimation survey is carried out manually per given image. The process to estimate the population of coral reefs is time consuming as well as laborious because there are so many images they have to manually estimate per categories of coral reefs. Therefore, if this process can be carried out automatically using digital image processing techniques, it is most welcome by the marine scientists.

In this assignment, you are given 3 images of coral reefs. **You need to design image processing algorithms that are able to segmentize 2 types of coral reefs and sand**. You may use different algorithms to separate these coral reefs and sand. The 2 type of coral reefs are branching (*Acropora*), branching (*Pocilopora darmicornis*) and sand. The sample of the ground truth of these types of coral reefs are given in Figure 1(a), 1(b) and 1(c). The test image files are given the zipped files. **You need to design the algorithms to segmentize the test image given and calculate the area of coverage of each of these types of coral reefs.**

(a) Sample of branching type (*Acropora*) with sand.



(b) Sample of branching type (*Pocilopora darmicornis*) and sand.

(c) Sample of branching type (Acropora) and sand.

Technical Report Contents (10% marks)

You need to write a report using the **given technical report format**. Your report should consist of the following items:

1. Introduction
2. Literature review
3. Research methodology
4. Results and Discussion

5. Conclusion
6. References
7. The MATLAB code should be attached in the appendixes.

Presentation Contents (10% marks):

You need to make a maximum of 10 minutes video presentation describing your solution. In the video, you should make a clear presentation of your solution toward estimating the coral reefs distribution in the given image. Upload your video in YouTube link and write this link in the report.

Image Processing Algorithm Solution (20%):

The remaining 20% marks will be given to the way you solve the given problems described in your report and your presentation. You are not expected to be able to fully solve the problem with 100% accuracy but marks are given to the way that you are trying to tackle and solve the given problem. You may describe your solution toward getting the best accuracy by displaying the flowchart and provide description of how to tackle this problem.