Digital Image Processing

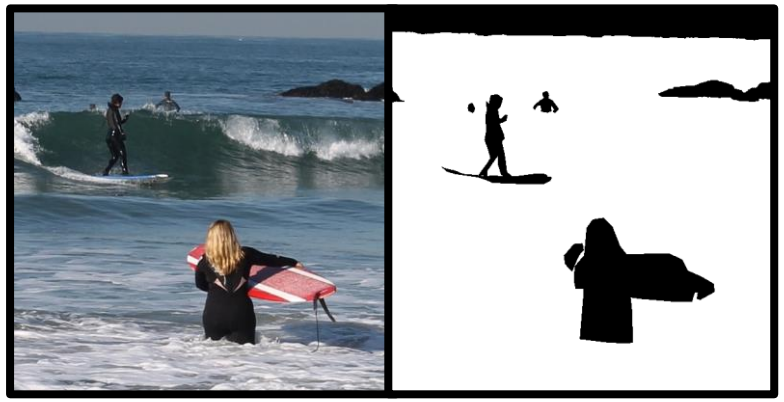
Final Project: Water Segmentation

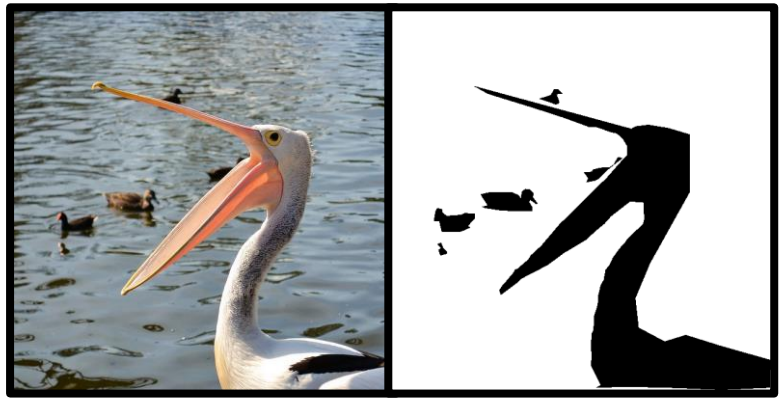
Team Composition

- The standard setup is 2 members per team.
- Teams with 3 members will have their final score reduced by 10% as a penalty.
- Teams with single member is not allowed.

Project Objective

- Perform water segmentation using 80 training images and their corresponding masks.





Conventional Method

- You need to develop a process that involves a proper feature extraction process, followed by a suitable pattern classification process based on the 80 training images.

- Any computer language is allowed
  - C, C++
  - MATLAB
  - Python

Deep Learning-based Method

- You need to choose a suitable model and learn and fine-tune the model using these 80 training images.
- The entire development process must be demonstrated in Google Colab.
  - Runtime limitation: Maximum 1 hour for complete training
- Do not use extra dataset.
- Do not use pretrained weights.

Grading Policy

- Demo(40 %) + Project content(60 %).
- Demo
  - Performance is measured using Average IoU (Intersection over Union) across 10 to 20 test images.
    - $IOU = \frac{Predicted\ Region \cap Ground\ Truth\ Region}{Predicted\ Region \cup Ground\ Truth\ Region}$
  - Base Score(20 %)
    - Awarded for achieving an IoU > 0.4.
  - Ranking Score (20 %)
    - Based on relative performance compared to other students.

Grading Policy

- Demo(40 %) + Project content(60 %).
- Project content
  - Based on your presentation video and your project report.
    - Novelty of Approach
      - Originality in problem-solving methodology
      - Creative solutions or unique combinations of existing methods
    - Depth of Investigation
      - Comprehensive analysis of results
      - Comparison of different approaches
      - Performance optimization attempts

Key Dates

- Check Point Review : 2024/12/3~4
  - Discuss your proposed approach with TAs.
- Online Demo : 2024/12/26~27
- Final Submission : 2024/12/30

Upload Format

- Upload a 10-15 minute video to YouTube and include the video link in a text file. The text file is uploaded to E3 with the following format:
  - [File Name] Teamxx_StudentID1Name1_ StudentID2Name2.txt
  - (ex: Team00_123456789 小明_223456789_小美.txt)

Remark: At the beginning of the video, please state your team number and individual names.

Upload Format

- Archive all the other materials in a zip file and upload the zip file to E3 with the following format and contents:
  - [File Name] final_project_StudentID.zip
  - (ex: Final_project_123456789.zip)
    - Final report in the format of .pdf
    - Your codes with comments (ipynb file for Google Colab)
    - A ReadMe.txt file to describe how to run your program
    - Your presentation slides in the format of .ppt