Project 3: Face Detection Tracking and Recognition

The goal of this project is to implement an end-to-end face detection, tracking and recognition system. A website which describes the concept is at

https://medium.com/@ageitgey/build-a-hardware-based-face-recognition-system-for-150-with-the-nvidia-jetson-nano-and-python-a25cb8c891fd

For this experiment, you can connect a camera physically to the Xavier processor. It is also acceptable to use a camera connected to your laptop/desktop computer to capture images or stream the video to the Xavier processor. During the final presentation, you will demonstrate the system and show the ability to do the following in realtime (with algorithm running on the Xavier Processor):

1. Detect, track and recognize your face in the live video. You should train the algorithm such that it can recognize your face either from the front or from the side. Use favorable lighting conditions so that the test and training images have similar illumination.
2. Detect, track and recognize a second person's face. For this purpose, you can use a printed picture of a team-member's face if it is not possible to be co-located during the demo.
3. Simultaneously detect, track and recognize both multiple faces.

4. Design your system so that the results of the live demo can be shown via zoom during class.

The system should run at least 10Hz. Quantify the following:

- Determine the full field of view of your camera, and the angular resolution of the pixels?
- How far from the camera can your system accurately recognize your face?
- At the farthest distance (where recognition is consistently possible) what is the number of pixels across the face (both vertically and horizontally) ?
- What is the accuracy of the model on the training data? What is the accuracy estimated during test as a function of distance from your camera?
- What is the power, temperature, and resource utilization of the processing during operation ?

Project plan:

Your project plan should show the following, each on a separate chart (i.e. three charts per team)-

1. A list of at least four to five key tasks that need to be accomplished to achieve the end goal of the project

2. A week by week time table of when each task will be completed. Show how the tasks depend on each other, whether they can progress in parallel or must be performed sequentially. An example of a simple format for a project schedule is shown below:

3. Roles and responsibilities – What each team member will do throughout the project. Each team has considerable flexibility in how it works together. However, it is desirable that the responsibilities are shared evenly, and rotated amongst the team members between projects.

Grading Policy:

The overall grade will be based on the following:

Technical effort: 10 pts
Achieving project objectives: 5 pts
Presentation: 5 pts
Team Coordination: 5 pts

This project is intended to be a collaborative effort (not a collection of separate efforts by individual team members). The duration of Interim presentations will 10 minutes per team. The final presentation will be 25 minutes per team, with additional 5 minutes for Q&A.