Hand Gesture Recognition

One of the most time consuming parts of machine learning is gathering and cleaning the data. Having uncluttered and clean data in extremely important as it reduces the complexity of the problem. Knowing how to gather and preprocess the data is a very useful skill. To this end, in this project we aim for the students to get a feeling of how this is done.

This project is about finding the number of finger one holds up in an image (video).

For data collection, students can use "OpenCv" library (Link).

Required project tasks:

1. For finding the number of fingers holding up in an image, the students should capture data from a webcam.
2. Photos should be stored in folders which determines the class name. For example, an image which shows holding up two fingers will be saved under a folder named "two".
3. The captured images should then be converted into a binary image (an image made up of only black and white pixels), with black background and hand white. This should be done programmatically. How this is done however, is up to the students. For example, they find the outline of hand and then fill the region inside, or have a threshold for pixel values, etc
4. In the end, the photos should be resized to be 50×50 pixels.
5. After preparing the data, the rest of the steps is the same as digit recognition. The data should be vectorized and be fed to the model. We expect to get one output which shows the number of fingers being held up in the image.
6. The selection of models is up to the students. They should find a model which (due to having a limited dataset) does not create the risk of overfitting

Important things to consider are:

- It is important for all students to comment their code in a way that if a someone new to the field reads the comments, they can replicate this code in the language of their choice.
- The language of your code should be in python.
- While it is okay to look at external material, the delivered code, comments and the accompanying report must be the students' original work.

Hints:

- It is suggested that the background should be static so it can be easily subtracted from the image (it is possible to use a simple white background too).
- It is better to only have the hand in the images. This will lead to less complexity for the problem.

Useful resources:

- Convex Hull (Link)
- Background Subtraction (Link)