Synopsis
(Minor Project-VI Semester)

Topic: Rule-Based Method for Human Activity Recognition

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ABOUT TOPIC:

  In this project, we perform recognition of human activities and scenarios in video image sequences.The proposed system consists of three major steps. Initially by using a single camera, the movement of the object is detected, and object silhouette is generated in each frame. The silhouette is used to determine human activities such as running and walking. In the last stage, a rule-based classifier is used to classify the action.

BACKGROUND:

Image Segmentation with Watershed Algorithm

Any grayscale image can be viewed as a topographic surface where high intensity denotes peaks and hills while low intensity denotes valleys. You start filling every isolated valleys (local minima) with different coloured water (labels). As the water rises, depending on the peaks (gradients) nearby, water from different valleys, obviously with different colours will start to merge. To avoid that, you build barriers in the locations where water merges. You continue the work of filling water and building barriers until all the peaks are under water. Then the barriers you created gives you the segmentation result. This is the "philosophy" behind the watershed.

But this approach gives over segmented result due to noise or any other irregularities in the image. So OpenCV implemented a marker-based watershed algorithm where you specify which are all valley points are to be merged and which are not. It is an interactive image segmentation. What we do is to give different labels for our object we know. Label the region which we are sure of being the foreground or object with one colour (or intensity), label the region which we are sure of being background or non-object with another colour and finally the region which we are not sure of anything, label it with 0. That is our marker. Then apply watershed algorithm. Then our marker will be updated with the labels we gave, and the boundaries of objects will have a value of -1.

Interactive Foreground Extraction using GrabCut Algorithm

Initially user draws a rectangle around the foreground region (foreground region should be completely inside the rectangle). Then algorithm segments it iteratively to get the best result. Done. But in some cases, the segmentation won't be fine, like, it may have marked some foreground region as background and vice versa. In that case, user need to do fine touch-ups. Just give some strokes on the images where some faulty results are there. Strokes basically says its opposite for background. Then in the next iteration, you get better results.

APPLICATIONS:

High-level understanding of human activity is essential for various applications, including surveillance systems and human computer interactions. In particular, a human activity recognition system may enable the detection of abnormal
activities as opposed to the normal activity of persons using public places like airports and subway stations. Automated human activity recognition may be useful for real-time monitoring of the elderly people, patients, or babies. Specifically, human action recognition aims at automatically telling the activity of a person, i.e. to identify if someone is walking, dancing, or performing other types of activities. It is a crucial prerequisite for a number of applications, including surveillance, content- based image retrieval, or human robot interaction. The task is challenging due to changes in the appearance of persons, articulation in poses, changing backgrounds, and camera movements.

TECHNOLOGY USED:

- ❿ OpenCV
- ❿ Language Used :Python
- ❿ Linux operating system