Project Title:
Hand gesture segmentation from uniform images

Project Description:
Automatic Sign Language Recognition System (ASLRS) presents a great opportunity between deaf and non-deaf individual community to communicate through a software without need of any interpreter [1]. A typical Automatic Sign Language Recognition System (ASLRS) requires the implementation of a complete processing chain, encompassing hand gesture segmentation, feature encoding and the recognition steps.

The hand gesture segmentation stage is required for the detection and localisation of the hand from the captured image. As mentioned in [2], this is a key and fundamental step, mainly since it is the earliest processing stage and any failure at this stage has a significant impact at the follow-up stages, with serious negative influence for the Automatic Sign Language Recognition performance achievable. In general, hand gestures can categorised in to two groups, namely static and dynamic gestures. Static gestures refer to the shape of the hand, where on the other hand dynamic gestures refer to the series of the hand movements [3].

At first several static hand gestures segmentation algorithms [4, 5] were successfully implemented since it is very easy to segment hand shape from the images with only uniform background (i.e. with dark background). However, it is still challenging task to segment hand shape from the images with non-uniform background (i.e. with complex background). Hence, in this project, you will focus on segmentation of static hand gestures using appearance based methods based on non-uniform (complex) hand gesture images. In general, project will involve the following steps:

1. Research non-uniform hand gesture databases
2. Review non-uniform hand gesture segmentations algorithm in the literature
3. Develop and implement a hand gesture segmentation algorithm proposed in the literature
4. Develop and implement a new hand gesture segmentation algorithm (that can overcome problems of the one prposed in the literature)
5. Evaluate and compare the performance of the proposed new algorithm and the poposed ones in the literature on the non-uniform database

Supervisor:
Meryem Erbilek

Software Requirements:
MATLAB

Hardware Requirements: PCs

References:

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[3] S. S. Kakkoth and S. Gharge, "Survey on Real Time Hand Gesture Recognition," in *International Conference on Current Trends in Computer, Electrical, Electronics and Communication*, 2017.

[4] S. N. Sawant and M. S. Kumbhar, "Real Time Sign Language Recognition using PCA," in *IEEE International Conference on Advanced Communication Control and Computing Technologies*, 2014.

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