Project Proposal: Hand Sign Recognition Based on Palm Gesture and Movement

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An extensive research has started recently in the area of hand gesture recognition. It is driven by a variety of possible applications in which the automatic detection. The most demanding and at the same time probably the most rewarding application is recognition of sign language that is used by impaired hearing people. Progress in enhanced interaction with computer may also facilitate game controls, remote hardware control and many other applications [1,2].

The approach we are proposing would be to identify particular hand gestures coupled with possible movements (up/down/left/right/forward/backward). The number of gestures themselves that can be reliably detected is very limited (especially in non-uniform lighting conditions and low camera resolution). However, if hand movement can be tracked simultaneously, the total number of possible *gesture-movement direction* pairs can be significantly larger.

As we can achieve greater detail in characterizing gestures with such a system(grouping them separately based on the hand movement associated), we hypothesize that applications of this characterization would allow for more granular recognition and tracking. Our goal is to implement fast online processing of gestures and movements into a set of gesture/movement buckets from the webcam-MATLAB interface. The detection process would use filtering, skin color detection, and hand-postures-contours comparison algorithms similar to [3] in the initial process of identifying or detecting hand gestures, and a systematic process of principal component analysis in identifying or recognizing such gestures(establishing an eigenspace on a training set and classifying by a Euclidean metric within that eigenspace for the test set from our webcam)[3].

For movement detection, we propose an approach that classifies movements based off an analysis of change across several snapshots of the movement(gradients of skin color across several images).

References

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