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An efficient hand gestures recognition system

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Abstract. Talking about gestures make us return to the historical beginning of human communication because there is no language completely free of gestures. People cannot communicate without gestures. Any action or movement without gestures is free of real feelings and cannot express the thoughts. The purpose of any hand gesture recognition system is to recognize the hand gesture and used it to transfer a certain meaning or for computer control or/and a device. This paper introduced an efficient system to recognize hand gestures in real-time. Generally, the system is divided into five phases, first to image acquisition, second to pre-processing the image, third for detection and segmentation of the hand region, fourth to features extraction and fifth to count the numbers of fingers for gesture recognition. The system has been coded by Python language, PyAutoGUI library, OS Module of Python and the Open CV library.

1. Introduction

Historically, the Electronic Visualization Lab was the first to create a data glove called Sayre Glove this was in 1977. Thirty-five years later, the researchers adopted the camera to interact with the computer. In fact, the camera is compared to the data glove and it is considered more direct and natural to achieve Human-Computer Interaction [1].

Recently, the interactive by gesture has become widely used and in the future may replace the mouse and/or keyboard by vision-based devices. The main feature of using hand gestures is to interact with the computer as an input unit. The gesture is defined as a form of nonverbal communication or non- vocal communication where the body's movement can convey certain messages. Gestures are originated from different parts of the human body, but the most common ones emerge from the hand or face.

Gesture provides a new form of interaction that reflects the experience of the user in the actual world. The interaction by the gesture is more natural and does not require any hindering or additional hardware.

There are two kinds of hand gestures, static and dynamic gestures. In [2] Liang introduced the best definition for static hand gestures (hand posture) and dynamic hand gesture as:

"Posture is a specific combination of hand position, orientation, and flexion observed at some time instance."

“Gesture is a sequence of postures connected by motion over a short time span.”

The good examples of static hand gesture are "OK" or "STOP" and "No", "Yes", "goodbye" for dynamic gestures.