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HAND GESTURE RECOGNITION FOR HUMAN COMPUTER INTERACTION

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Abstract: Hand Gesture Recognition is a way of human computer interaction. Gesture provides a way for computers to understand human body language. Gesture Recognition deals with the goal of interpreting hand gestures via mathematical algorithms. It enables humans to interact with the machines (Human Machine Interface) and interact naturally without any mechanical devices. Hand gesture recognition technology would allow for the operation of complex machines using only a series of fingers and hand palm movements, eliminating the need for physical contact between operator and machine. The overall system consists of two parts, back end and front-end. The back end system consists of three modules: Camera module, Detection module and Interface module.

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I INTRODUCTION

Hand gesture recognition technology would allow for the operation of complex machines using only a series of fingers and hand palm movements, eliminating the need for physical contact between operator and machine. The overall system consists of two parts, back end and front-end. The back end system consists of three modules: Camera module, Detection module and Interface module.

1.Problem Statement : To create a system which can identify specific human hand gestures and use them to convey information or for device control using convolutional neural networks.

2.Algorithmic Approach:

I. Camera Module

Step 1 : Noise Removal and Image Smoothening

Noise Removal and Image Smoothening where image is converted to grayscale. Noise removal and smoothing of images is done.

Step 2: Thresholding

Thresholding, which is a simple segmentation method, is then carried out. Thresholding is applied to obtain a binary image from a grayscale image. The two types of thresholding that are implemented are Inverted Binary Thresholding and Otsu's Thresholding.

II. DETECTION MODULE

Step 3: Contour Extraction

It is used to detect and recognize the hand from the background. The curves that link continuous points, which are of the same color, are called contours. This step is to draw the contours which can be used to draw any shape provided the boundary points are known.

Step 4: Convex Hull and Convexity Defects

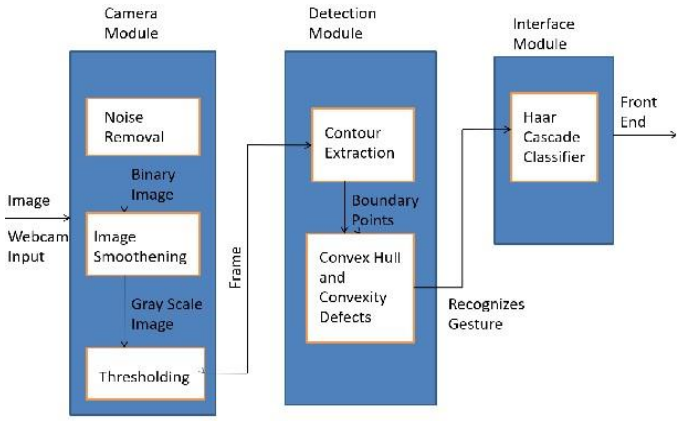
Convex hull is found along with convexity defects. Depending upon convexity defects gestures are recognised. Convex hull of a set X of points in any affine space is defined as the smallest convex set that contains X. Any deviation of the object from this convex hull can be considered as a convexity defect.

III. INTERFACE MODULE

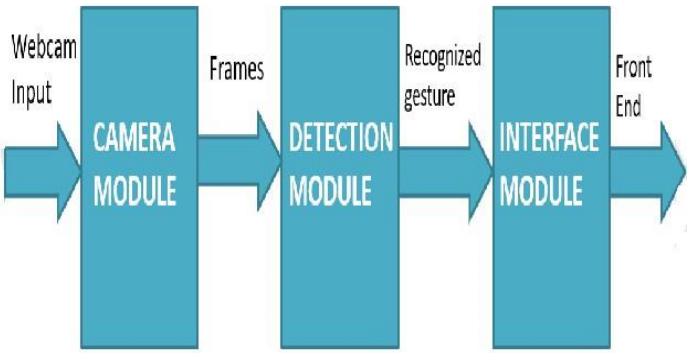
Step 5: Haar Cascade Classifier

For gestures without exposing of fingers like palm and fist where there are no convexity defects, Haar cascade classifier is used. Haar Cascade is a machine learning based approach where a lot of positive and negative images are used to train the classifier.

4.ARCHITECTURAL/BLOCK DIAGRAM :



Architectural Diagram



Block Diagram

5. DATA SET/INPUT:

1)EgoGesture Dataset - This dataset provides the test-bed not only for gesture classification in segmented data but also for gesture detection in continuous data.

2)HGM4 - A new multi-cameras dataset for hand gesture recognition.The HGM-4 dataset is built for hand gesture recognition.

6. CONCLUSION/APPLICATIONS:

We will be able to create a robust gesture recognition system without utilizing any markers to make it more user friendly and low cost. We have aimed to provide gestures, covering almost all aspects of HCI such as system functionalities, launching of applications and opening some popular websites.

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