

# Gesture Analysis

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**Abstract**— The research field of Artificial Intelligence has fulfilled many promises, even if the achievements are different from the unrealistic demands. The limitations of current robotics are clearly revealed when it comes to communication. The communication method used by each human being is different and when it comes to deaf people, the sign language is the main source of communication. In this paper we try to solve the problem of evaluating sign and gestures by implementing an algorithm to detect the gesture. We use two images as current image which has been captured and base image which matches it approx 60% and above. There are mainly three steps involved and they are capturing the gesture, cleaning the input and then finally matching it with any template present for proper interpretation.

**Key words:** Gesture Recognition, Hand Gestures, Gesture Analysis, Gesture Processing, Pattern Recognition and Matching, Gesture Image Cleaning, HSB Cleaning

## I. INTRODUCTION

In today's world communication plays an important role in overall personality of the individual, but it becomes interesting when people with certain constraints come into picture to communicate with the machines or agents. The Deaf people when communicating with the computers cannot pass the primary input i.e. vocal input so this is when we need certain algorithms to interpret the gestures and overcome the hurdles in communication. The sign language or Gesture language is one which can be used by making some actions by hands, but then also one problem remains that every geographical ,locations have different sign languages .So to create a central medium we propose an algorithm for deaf or disabled people to communicate with agents in this modern age of Computers. This Algorithm has a central database stored with some common gestures and their interpretation and meaning.

## II. LITERATURE SURVEY

The present study describes a framework that support sign language recognition and interaction to serve as standard that should be used by Computer in order to get back the field's genuine task of developing effective as well as efficient technologically derived services that take the deaf's needs into consideration towards social inclusion. [D. R. Antunes, C. Guimaraes, L. S. Garcia, L. E. S. Oliveira, and S. Fernandes, "A framework to support development of sign language human-computer interaction: Building tools for effective information access and inclusion of the deaf,"[2]].

Here, a model-based approach to the problem is put forward which is an optimization problem that minimizes the discrepancy between the 3D structure and hand model instances, and actual visual observations. [I. Oikonomidis, N. Kyriazis, and A. Argyros, "Efficient model-based 3d tracking of hand articulations using kinect"[5]]

## III. ARCHITECTURE

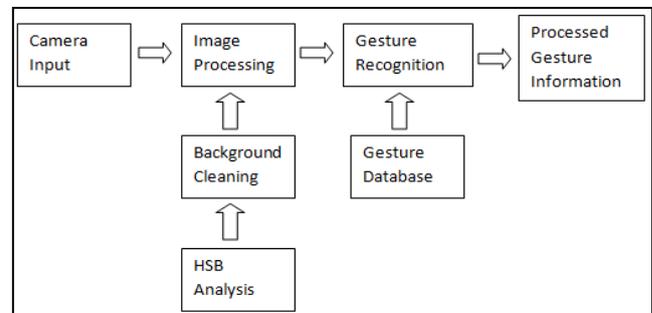


Fig. 1: Architecture

## IV. METHODOLOGY

The Algorithm is mainly divided into three phases namely:

- 1) Image Capturing:
- 2) Background Cleaning
- 3) Base Image Matching

### A. Image Capturing

In this phase we use a camera or any other such input device that can capture image of the gesture or the sign that has been displayed by user. The captured image is then stored in the directory specified for the algorithm that can be used to extract the image later. The image must be captured clearly without any blur or shadow effect for better performance of the Algorithm.

### B. Background Clearing or Removal

This step takes the images that is captured in the image capturing stage and perform various checking and tests on it. It is mainly divided into two models:

- Extraction & Analysis

In this step the object is extracted from the overall image by using Contour Extraction. Contour Extraction is a method which extracts an image shape or object by extracting their boundaries.

The next part in this step is cleaning or refining the image that is removing any additional noise or disturbance generated in the image.

- HSB Model

HSB model stands for Hue-Saturation-Brightness model. This model mainly focuses on the color of the model rather than the shape of object. The HSB parameters play an important role in cleaning the image as brighter the image it is clearer to scan and interpret. In the HSB model, the main challenge is to identify the skin color and the background area of the image.

- 1) Hue

Hue represent the dominant colors like blue, green, red, yellow, etc.

- 2) Saturation

Saturation measures ratio of area of image to its brightness.

### 3) Brightness

It is related to the light value in the image and should be balanced to avoid blur image.

#### – Base Image Matching

The algorithm contains some inbuilt template of gestures and also their meanings and vocal pronunciations. This step in the algorithm is mainly comparing the Image obtained from above step with any matching template. The two main components in this steps are the source image that is provided by earlier stage after cleaning and the template that is somewhat matching to the source image. The Criteria is that it must at least match 65% with the template to prove that obtained gesture is same as gesture ion template. The criterion is the main constraint and must be satisfied to successful and accurate working of the algorithm.

In below figure we can see the flow of actual data in the algorithm and actions performed:

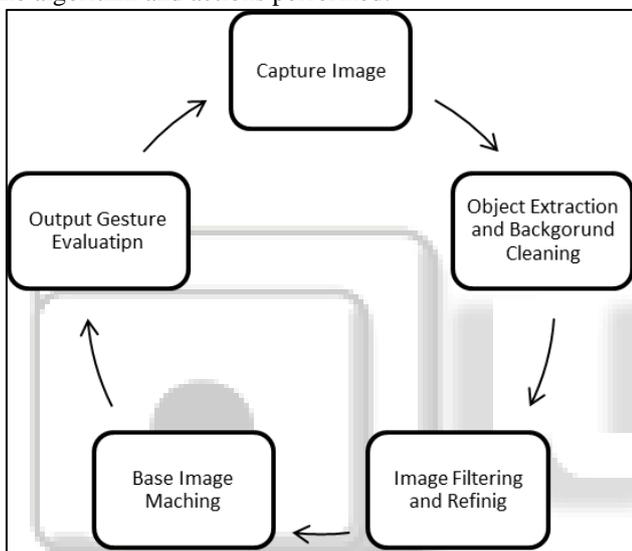


Fig. 2: Flow of the Algorithm

We can also implement a module that outputs the processed gesture as an audio output which can be used to increase the flexibility and convenience of the algorithm and also increases the reach of the algorithm. The Audio output model can include speakers and amplifiers for better performance of the algorithm or the system.

## V. CONCLUSION

The Gesture Analysis Algorithm using Artificial Intelligence is elaborated. The system is designed by the steps described above. As we move in geographical locations the meaning of sign languages may get change as well as the representation, but this solution can be maintained as a central solution to many of the common gestures and their interpretation. The Algorithm’s central database is the advantage of this algorithm. The algorithm matches the gesture if and only if it matches the database. The speed of the texture matching can be varied depending on the time the image takes to process.

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