

# Hand Gesture Recognition in Full Duplex Way

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**ABSTRACT:** Hands are the most common forms of communication in our world. They can help create a safe and comfortable user environment for a multitude of applications. Various computer viewing algorithms have used a colored camera and depth to monitor hands, but strict separation of gestures from various subjects remains a challenge. Hence approving hands-on recognition and effective communication of communication from the ordinary to the deaf. In this part of the work hereby introducing two ways of communication. Hence making use of algorithms for image processing will be useful for hand gesture recognition.

**KEYWORDS:** Deep Learning, Hand Gesture Recognition.

## 1.INTRODUCTION

The system focuses on visualization of bare hands by suggesting new constructions to solve the problem of real-time vision acquisition, tracking, and gesture recognition by interacting with the application manually. The first phase of our program allows detecting and tracking an empty hand behind a spam site using facial scrubs, skin detection and contour comparisons. The second phase allows for the detection of hand gestures using handbags and multi-class Support Vector Machine

(SVM) algorithms. Finally, the grammar was created to generate touch control commands for the application. Our hands-on recognition program consists of two steps: offline training and online testing. In the training phase, after extracting the keys of all training images using the Scale Invariance Feature Transform (SIFT), the vector-raising process will extract the images from all training images into a combined histogram vector (word bag) after Kmeans integration. This histogram is treated as an input vector of SVM [7,6] with multiple layers to create a classifier. In the test section, of all the frames taken from the webcam, a hand is obtained using my algorithm. After that, the buttons are pulled from all the small images containing the handwritten text received and transferred to the cluster model to put them in the wordpress tags, which are offered in the SVM class for most classes to see the hand gestures. Another gesture recognition program has been developed using the PCA. The eigenvectors and size of the training images are determined. In the test phase, hand detection is obtained for all frames using my algorithm. Subsequently, a small image containing the recovered hand is identified by the eigenvector of the training images to construct the experimental instruments. Finally, the minimum Euclidean distance is determined between the experimental weights and the training instruments of each training image to see the hand-made action.

## II.LITERATURE SURVEY

**1: Vladimir I. Pavlovic, Rajeev Sharma, and Thomas S. Huang** (1997) have focused on Visual Interpretation of Hand Gestures for Human-Computer Interaction

The use of hand gestures provides an attractive alternative to cumbersome interfacedevices for human-computer interaction (HCI). In particular, visual interpretation of handgestures can help in achieving the ease and naturalness desired for HCI. This has motivated a very active research area concerned with computer vision-based analysis and interpretation ofhand gestures. As per the survey the literature on visual interpretation of hand gestures in the context of its role in HCI. This discussion is organized on the basis of the method used for modeling,analyzing, and recognizing gestures. Important differences in the gesture interpretationapproaches arise depending on whether a 3D model of the human hand or an image appearancemodel of the human hand is used. 3D hand models offer a way of more elaborate modeling ofhand gestures but lead to computational hurdles that have not been overcome given the real-time requirements of HCI. Appearance-based models lead to computationally efficient “purposive” approaches that work well under constrained situations but seem to lack the generality desirablefor HCI. Also discuss implementation of gestural systems as well as other potential applications ofvision-based gesture recognition. Although the current progress is encouraging, furthertheoretical as well as computational advances are needed before gestures can be widely

used for HCI. The project discusses directions of future research in gesture recognition, including its integration with other natural modes of human-computer interaction.

**2: Pedro Trindade, Jorge Lobo and João P. Barreto** (2012) have focused on Handgesture recognition using color and depth images enhanced with hand angular pose data

In this paper propose a hand gesture recognition system that relies on color and depth images, and on a small pose sensor on the human palm. Monocular and stereo vision systems have been used for human pose and gesture recognition, but with limited scope due to limitations on texture, illumination, etc. New RGB-Depth sensors, that rely on projected light such as the Microsoft Kinect, have overcome many of those limitations. However, the point clouds for hand gestures are still in many cases noisy and partially occluded, and recognition is non-trivial. Handgesture recognition is much more complex than full body motion, since the hands in any orientation and cannot assume a standing body on a ground plane. In this work the system can be proposed to add a tiny pose sensor to the human palm, with a minute accelerometer and magnetometer that combined provide 3D angular pose, to reduce the search space and have a robust and computationally light recognition method. Starting with the full depth image point cloud, segmentation can be performed by taking into account the relative depth and hand orientation, as well as skin color. Identification is then performed by matching 3D voxel occupancy against a gesture template database. Preliminary results are presented for the recognition of Portuguese Sign Language alphabet, showing the validity of the approach.

**3: Nasser Dardas** (2012) has focused on Real-time Hand Gesture Detection and Recognition for Human Computer Interaction

The paper focuses on bare hand gesture recognition by proposing a new architecture to solve the problem of real-time vision-based hand detection, tracking, and gesture recognition for interaction with an application via hand gestures. The first stage of our system allows detecting and tracking a bare hand in a cluttered background using face subtraction, skin detection and contour comparison. The second stage allows recognizing hand gestures using bag-of-features and multi-class Support Vector Machine (SVM) algorithms. Finally, a grammar has been developed to generate gesture commands for application control. Our hand gesture recognition system consists of two steps: offline training and online testing. In the training stage, after extracting the keypoints for every training image using the Scale Invariance Feature Transform (SIFT), a vector quantization

technique will map keypoints from every training image into a unified dimensional histogram vector (bag-of-words) after K-means clustering. This histogram is treated as an input vector for a multi-class SVM to build the classifier. In the testing stage, for every frame captured from a webcam, the hand is detected using my algorithm. Then, the keypoints are extracted for every small image that contains the detected hand posture and fed into the cluster model to map them into a bag-of-words vector, which is fed into the multi-class SVM classifier to recognize the hand gesture. Another hand gesture recognition system was proposed using Principle Components Analysis (PCA). The most eigenvectors and weights of training images are determined. In the testing stage, the hand posture is detected for every frame using my algorithm. Then, the small image that contains the detected hand is projected onto the most eigenvectors of training images to form its test weights. Finally, the minimum Euclidean distance is determined among the test weights and the training weights of each training image to recognize the hand gesture. Two applications of gesture-based interaction with a 3D gaming virtual environment were implemented. The exertion videogame makes use of a stationary bicycle as one of the main inputs for game playing. The user can control and direct left-right movement and shooting actions in the game by a set of hand gesture commands, while in the second game, the user can control and direct a helicopter over the city by a set of hand gesture commands.

### III. PROPOSED SYSTEM

To communicate with Deaf and Dumb people using only deaf and silent language, there is no automatic tool to convert that into an audio format. Hence it is difficult for normal person to communicate with deaf and dumb. Hands are the most common and important means of communication in our world. They can help create a safe and comfortable user environment for a multitude of applications. Various computer viewing algorithms use a color camera and hand recognition depth, but they are one way to communicate. The system incorporates hands-on recognition and dual-channel communication. Our system applies an android application for voice input and word recognition using the Google Speech Recognition API and keywords are converted into keywords and then the associated images of signs [5] are displayed to the deaf and the dumb. Using this technique, the system enables two-way communication. **Fig.3** illustrates the hand gesture recognition system significantly in full duplex form.

There are 6 modules in hand gesture recognition

- Hand gesture training
- Water shed segmentation
- SIFT algorithm
- Support Vector Machine Analysis
- Voice Transformation
- Android Application

### HAND GESTURE TRAINING

Physical hands are stored at the end of the user to store data. The training set was made from the end user and the comparison was made to the gesture recognition[1]. Hand gestures and criminal acts are also reserved for comparisons that identify the action and crimes committed by the user.

### WATER SHED SEGMENTATION

Watershed is an ancient algorithm used for classification, that is, to distinguish different objects from an image. Fig.1 helps to explain the system how to distinguish the object. From user-defined marks, the fluid algorithm treats the pixel values as the area of the (height). The algorithm floods the strings from the marks until the bases are said to be inserted into different marks that intersect in the water lines. In most cases, the markers are chosen as small minima of the image, where the full of holes, should be separated by two broad circles. To do so, one combines a distance-based image in the background. The maxima of this range (e.g., the pre-range minima) are chosen as marks and the saturation of the fluids from these markers separates the two circles in the dotted line. Here in this project, the distinction of the Hand image can be properly marked. Only then can the hand movement be completely captured.

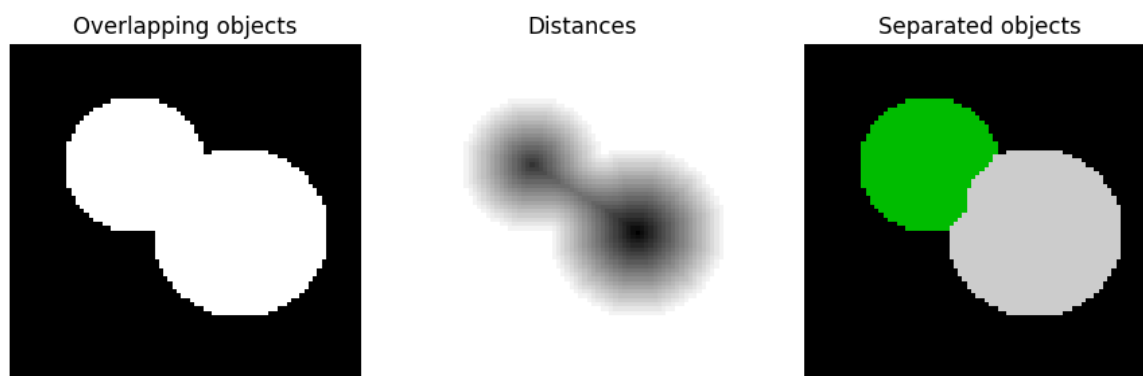


Fig.1: To distinguish different image.

### SIFT ALGORITHM

The SIFT keypad of the item is first extracted from the set of images viewed and stored in a database. The item is viewed in a new image by comparing each element from a new image in the database and obtains features to match a person based on the Euclidean distance of their feature range. From a complete set of matches, the captions of the keypad that fit into the item and its location, scale, and size[2,3] in the new image are identified to filter the best matches. Determination of fixed stems is made immediately using the hash table functionality of the Hough general transformation. Each set of 3 or more elements that fit into an object and its element is then subjected to further model validation and then later released. In the end it is possible that a particular set of features indicates the presence of an object, given the precision and number of possible false plays. Match for the best of these tests can be identified as correct with high confidence. Using this algorithm, the SIFT algorithm detects the overlapping keyboards of a given image. Fig.2 illustrate the keypoints of capture image. The location of the key points and the average values of each keypad are determined accurately. Afterwards, the direction of the keypad is determined based on the gradient[4] of the area image within the image. The SIFT algorithm successfully determines the keys to those deep images and represents them as feature descriptions.

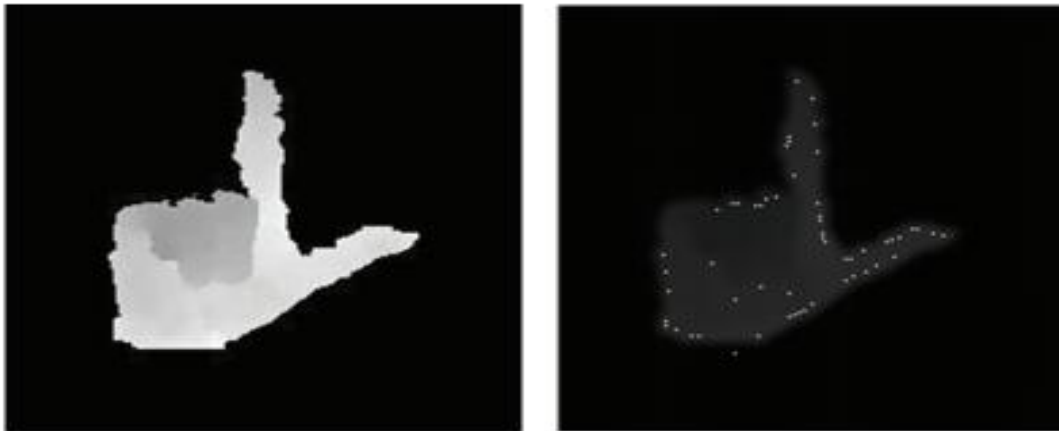


Fig.2: Key points image

**SUPPORT VECTOR MACHINE ANALYSIS**

The SVM determines that the support veins are too close to the splitter separator. Stocks are also contaminated by those subsidiaries. Higher separation is ensured by a higher margin hyperplane. Our system have used one method to combat it all using the SVM classifier that builds a model in relation to the training provided by the group consumer.

**VOICE TRANSFORMATION**

After discovery and adoption, voice detection is provided to the average person. This facilitates the effective communication between the deaf and the deaf and the ordinary.

**ANDROID APPLICATION**

The Normal Person will communicate with the android app by providing a voice [8,9,10] that is converted into text using the Google Speech API. Keywords are converted into an image and then transferred to a corresponding image and sent to a deaf and dumb person. An image is identified to confirm the two-way communication between the ordinary and the deaf and the deaf.

**ARCHITECTURE DIAGRAM:**

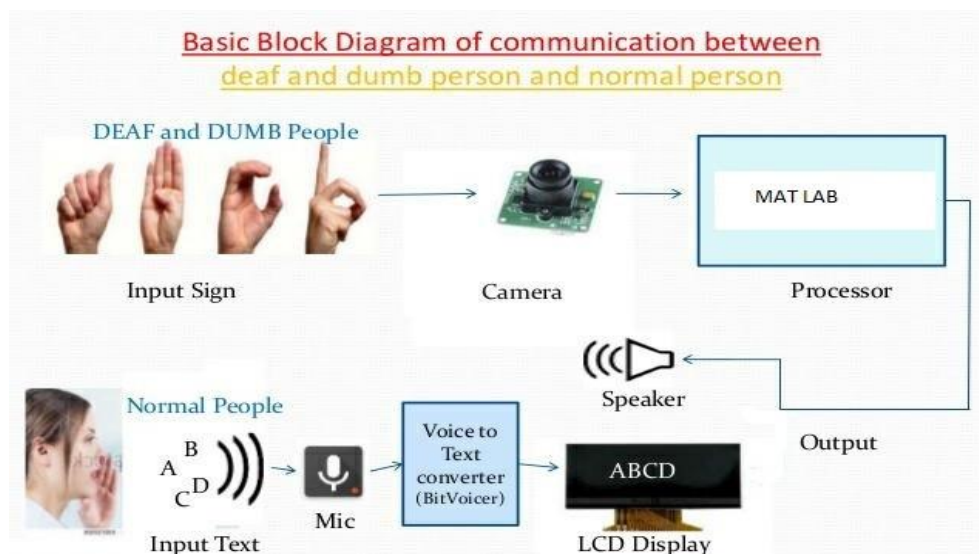


Fig.3: Block diagram of hand gesture recognition system

IV.EXPERIMENTAL ANALYSIS

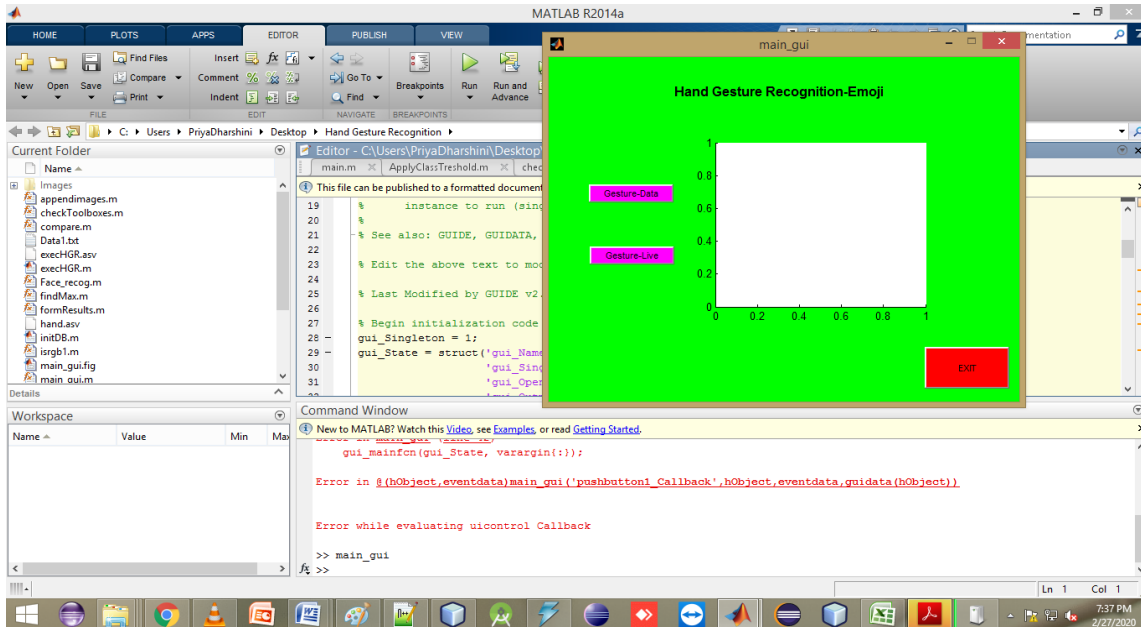


Fig.4: Initial interface to capture the hand gesture

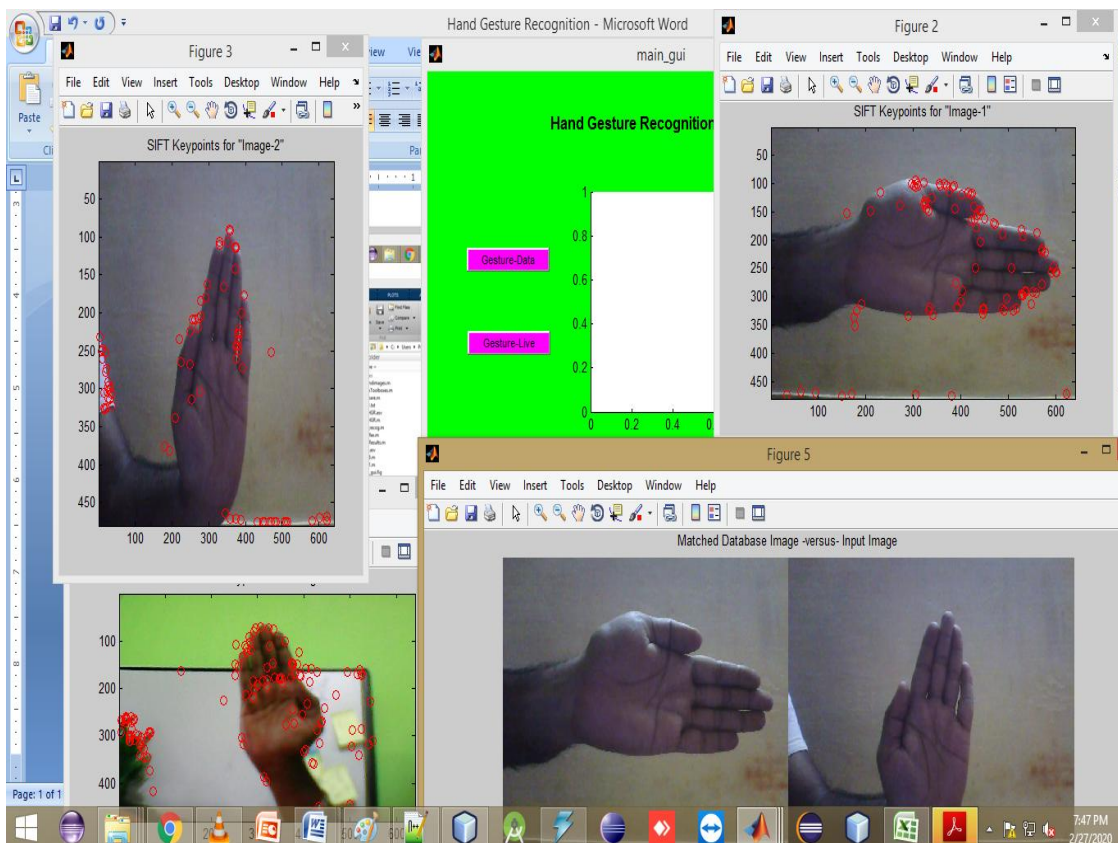


Fig.5: Processing the image to find its match



## V.CONCLUSION

SIFT and Water shed algorithm are used to compare the images of hand gestures based on their edges and internal features. Later they are classified by SVM algorithm. Hence the voice for corresponding gesture is delivered. For the other way communication the gesture is displayed by android application for the voice what the normal person say.

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