

Text Generation Using Hand Gesture Recognition

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Abstract

Now day's much research is going on in the field of Artificial Intelligence in Natural language processing. Hand gesture, body postures are also the natural languages. The use of hand gestures provides an attractive alternative to the cumbersome interface devices for human-computer interaction (HCI). The primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information. A gesture may be defined as a physical movement of the hands, arms, face, and body with the intent to convey information or meaning. Some medium is required for a deaf person to interact with a normal person. Sign language is the best media to interact between them. There different sign languages used all over the world such American sign language(ASL), British sign language, Italian sign language, Chinese sign language, Indian sign language etc. Similarly Indian sign language is developed for Indians during the literature survey we analyzed various hand gesture recognition systems which use some different approach and algorithms. Commonly two approaches of gesture recognition are data gloves and vision based. We studied main function of hand gesture recognition it convert the sign language into some text format and sound.

Also we did the requirement analysis and modeling hand gesture recognition system. Further we did the designing of various modules of text generation using hand gesture recognition system. Therefore gesture recognition system we were designed by using predefined approach with some advanced algorithm which gives accuracy and helps to convert gestures into text format. This system provide basic feature like data acquisition, segmentation, feature extraction, skin detection and sign to text conversion.

I. INTRODUCTION

Computer recognition of sign language is an important research problem for enabling communication with hearing impaired people. This system introduces efficient and fast approaches for identification of the hand gesture representing an alphabet of the Sign Language. In the last several years there has been an increased interest among the researchers in the field of sign language recognition to introduce means of interaction from human to human and human to computer interaction. Deaf and Dumb people rely on sign language interpreters for communications. In “Text generation using hand gesture recognition” system presents design and implementation of real time Sign Language Recognition system to recognize 26 gestures from the Indian Sign Language.

The signs are captured by using web cam. This signs are processed for feature extraction using some color model. The obtained features are compared by using some algorithm. After comparing features of captured sign with testing database to calculate for sign recognition. Finally, recognized gesture is converted into text and voice format. This system provides an opportunity for a deaf-dumb people to communicate with non-signing people without the need of an interpreter.

II. LITRATURE SURVEY

“Application research on face detection technology uses OpenCV technology in mobile augmented reality” it introduces the typical technology. Open source computer vision library, OpenCV for short is a cross-platform library computer vision based on open source distribution. Very rich visual processing algorithm provided by the OpenCV, with c language to write and it part, combined with the characteristics of its open source. This will helps to learn visual processing algorithm which is provided by OpenCV. [1] “a study of vision based hand gesture recognition for human machine interaction” in this paper author proposed the approaches for hand gesture recognition. Two approaches are commonly used to interpret gestures for human computer interaction. They are (a) methods which use data gloves: this method employs sensors (mechanical or optical) attached to a glove that transduces finger flexion into electrical signals for determining the hand posture.[2] “hand talk-a sign language recognition based on accelerometer and semg data” this paper introduces American sign language conventions. It is part of the “deaf culture” and includes its own system of puns, inside jokes, etc. As an English speaker would have trouble understanding someone speaking Japanese, a speaker of ASL would have trouble

understanding the sign language of Sweden. ASL also has its own grammar that is different from English. ASL consists of no. Of gestures; approximately 6000 gestures of common words with spelling using finger used to communicate obscure words or proper nouns.[3] “hand gesture recognition and voice conversion system for dumb people” this project aims to lower the communication gap between the mute community and additionally the standard world. The projected methodology interprets language into speech. The system overcomes the necessary time difficulties of dumb people and improves their manner. Compared with existing system the projected arrangement is simple as well as compact and is possible to carry to any places. This system converts the language in associate text into voice that's well explicable by blind and ancient people. The language interprets into some text kind displayed on the digital display screen, to facilitate the deaf people likewise. In world applications, this system is helpful for deaf and dumb of us those cannot communicate with ancient person. [4] Conversion of RGB to gray scale and gray scale to binary conversion this concept introduced in this “intelligent sign language recognition using image processing” paper. Basically any color image is a combination of red, green, blue colors. An important trade-off when implementing a computer vision system is to select whether to differentiate objects using colour or black and white and, if colour, to decide what colour space to use (red, green, blue or hue, saturation, luminosity).

III. METHODOLOGY

The sign Recognition procedure includes following major steps. They are a) Data Acquisition b) Preprocessing and segmentation c) Feature extraction d) Sign recognition and e) conversion of Sign to text and text to voice.

A. Data Acquisition:

For getting a high accuracy for sign recognition in sign language recognition system we use images single hand based on the location, property, hand side and no. of figure count. These images are included in database for testing purpose. The images are captured at a high resolution of 3000x4000 pixels. The captured images for test phase are captured using web camera .To avoid illumination effect the images are captured in white background.

B. Image preprocessing and segmentation:

In preprocessing process consist image acquisition, segmentation process and morphological filtering methods. Then the Segmentation of hands is carried out to separate object and the background. Cluster detection and edge detection algorithm are used for segmentation purpose. The captured or segmented hand image is represented certain features. These features are further used for gesture recognition. The preprocessing operation is done on the stored database.

C. Feature Extraction:

Feature extraction is a process of reducing data dimensionality by encoding related information in a compressed representation and removing less discriminative data. Feature extraction is vital to gesture recognition performance. Therefore, the selection of which features to deal with and the extraction method are probably the most significant design

decisions in hand motion and gesture recognition development. Here we used Centroid, skin color and principal component as main features.

D. Skin Detection:

Skin detection is used to search for the human hands and discard other skin colored objects for every frame captured from a webcam shown in after detecting skin area for every frame captured; we used contours comparison of that area with the loaded hand postures contours to get rid of other skin like objects exist in the image.

E. Sign Recognition:

It is a dimensionality reduction technique based on extracting the desired number of principal components of the multi-dimensional data. Develop a finger count detection program by using EmguCV technology. Following snapshots shows the identification of count of finger detected by the program and also shows the skin edge detection part.

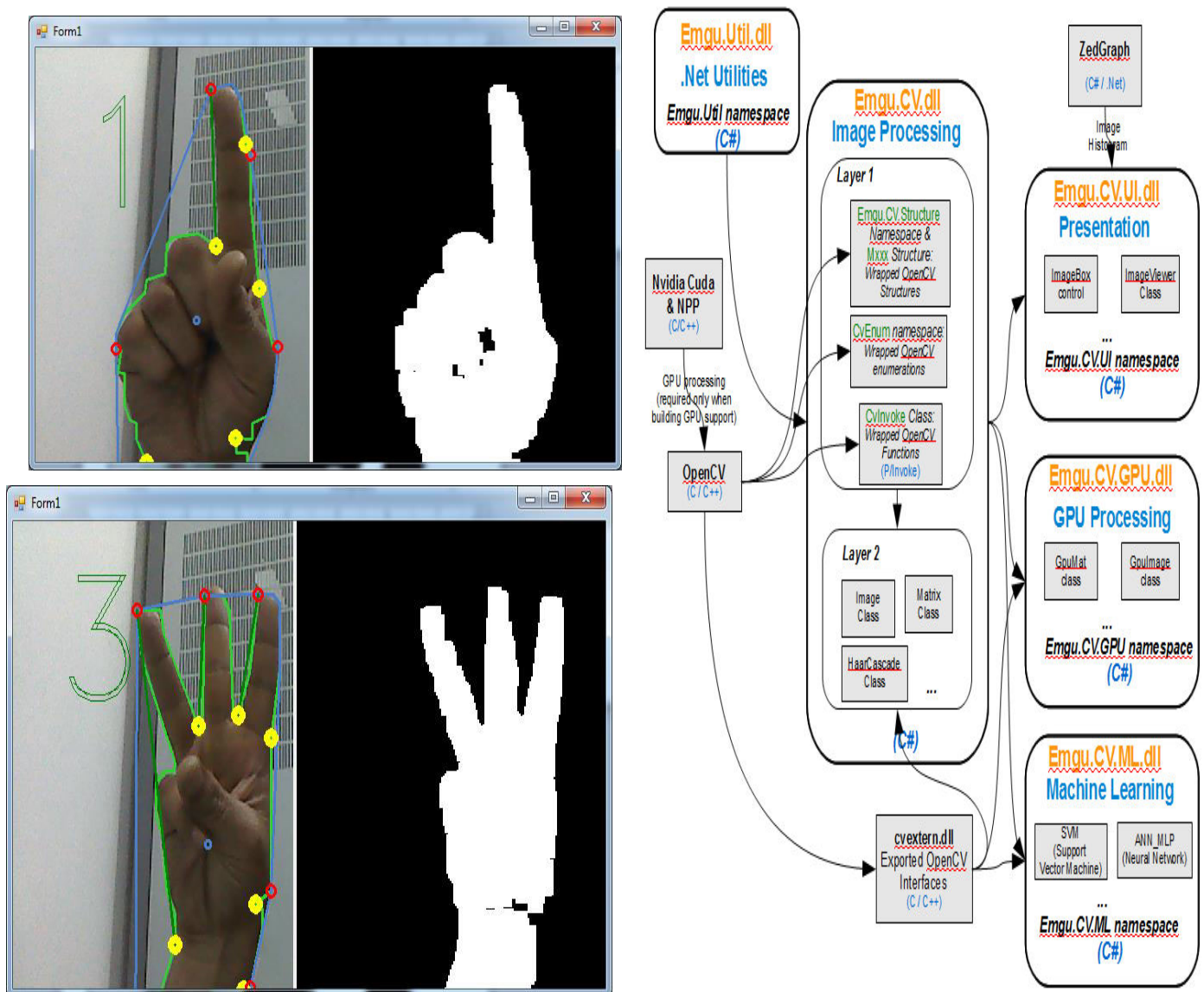
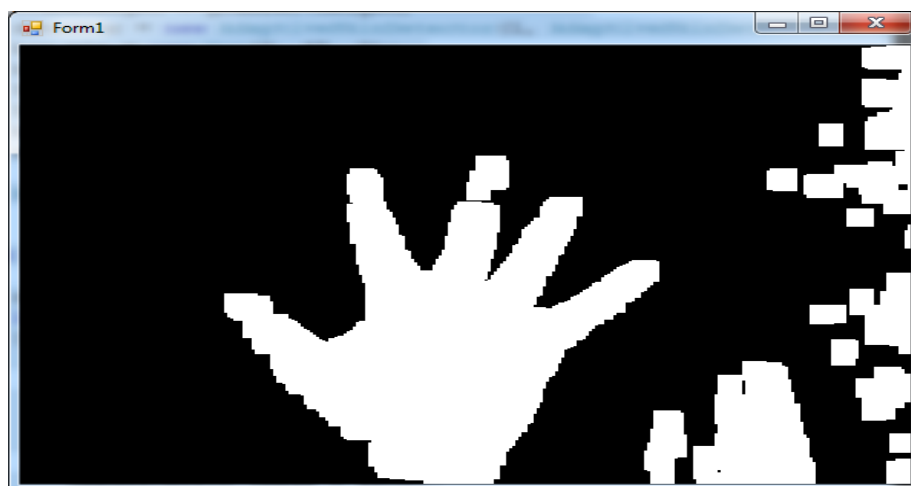


Figure 1: EmguCV Architecture

IV. IMPLEMENTATION

As a part of progress here we are giving brief idea about the technology used and its architecture. We have used EmguCV SDK technology in order to achieve high accuracy with real time processing speed in real environment. EmguCV is a cross platform .Net wrapper to the OpenCV image processing library. Allowing OpenCV functions to be called from .NET compatible languages such as C#, VB, VC++, Iron Python etc. The wrapper can be compiled in Mono and run on Windows, Linux, Mac OS X, iPhone, iPad and Android devices. It is essentially a huge library of “wrapper” functions that allows calling OpenCV functions from a Visual Studio Windows Forms application. It is necessary because Visual Studio/.NET is an “interpreted” environment that cannot directly call functions written in native C/C++. As shown in fig. 1.0 Emgu CV gives different application level functionality. Proposed system is mainly dealing with image processing section. Advantage using this technology over image processing language like Matlab is that it gives us more control over the source code in order to achieve most realistic output with max use of processing speed. Rather than wrapping complete code in to single function it has multiple methods compiled in to different classes gives us better code understanding. As experimental result following example shows basic skin detection program sample with main functions used.



1. grabber = new Emgu.CV.Capture(0)
❖ Capture and start camera view in to picture box.
2. detector=newAdaptiveSkinDetector(1,AdaptiveSkinDetector.MorphingMethod.NONE)
❖ Creating a skin detector object in adaptive mode.
3. YCrCb_min = new Ycc(0, 131, 80), YCrCb_max = new Ycc(255, 185, 135);
❖ Defining the minimum and maximum skin color tone values in YCrCb mode.
4. currentFrameCopy = currentFrame.Copy()
❖ Capture current frame from camera streaming view.
5. skinDetector = new YCrCbSkinDetector();
❖ Start skin detector object.
6. Image<Gray,Byte>skin=SkinDetector.DetectSkin(currentFrameCopy,YCrCb_min,YCrCb_max);
❖ Convert the detected skin area in to gray scale.
7. imageBoxSkin.Image = skin;

❖ Finally show the output in to picture box.

V. CONCLUSION

Using various concepts of image processing and fundamental properties of image we tried to developed this system. In gesture recognition system for skin area detection we used cluster detection algorithm. For boundary filling we used edge detection algorithm and pixel detection task done by using pixel detection algorithm. By using those algorithms recognition of gesture has done successfully. For the conversion of text speech we used some speech API.

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