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Indian Sign Language Recognition System for Differently-able People

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Abstract: Sign languages commonly develop in deaf communities, that can include interpreters and friends and families of deaf people as well as people who are deaf or hard of hearing themselves. Sign Language Recognition is one of the most growing fields of research today. There are Many new techniques that have been developed recently in these fields. Here in this paper, we will propose a system for conversion of Indian sign language to text using Open CV.

OpenCV designed to generate motion template images that can be used to rapidly determine where that motion occurred, how that motion occurred, and in which direction it occurred. There is also support for static gesture recognition in OpenCV which can locate hand position and define orientation (right or left) in image and create hand mask image. In this we will use image processing in which captured image will be processed which are digital in nature by the digital computer. By this we will enhance the quality of a picture so that it looks better.

Our aim is to design a human computer interface system that can recognize language of the deaf and dumb accurately.

Keywords: Indian Sign Language, Open CV, Image Processing

1. INTRODUCTION

One of the most precious gifts of nature to the human breed is the ability to express himself by responding to the events occurring in his surroundings.

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Every normal person sees, listens and then reacts to situations by speaking himself out in the environment. But there are some less fortunate people those are deprived of many valuable gift. Such impaired people rely on some sort of sign language for communicating their feelings to others. The deaf, dumb and the blind follow same problems or issues, when it comes to the use of computers.

In the era of advanced technology, where computers or laptops and other processor based devices are an integral part of day to day life, efforts are required to be done for making the disables more independent in life**.** Inspite of that, there are people who are less fortunate than us and are physically i, may it be deafness or being aphonic. Such people lag behind impaired, their non-handicapped peers in using these technologies. These people have some expectations from the researchers and mostly from a computer scientist that we, computer scientists can provide some machine/model which help them to communicate and express their feelings with others.

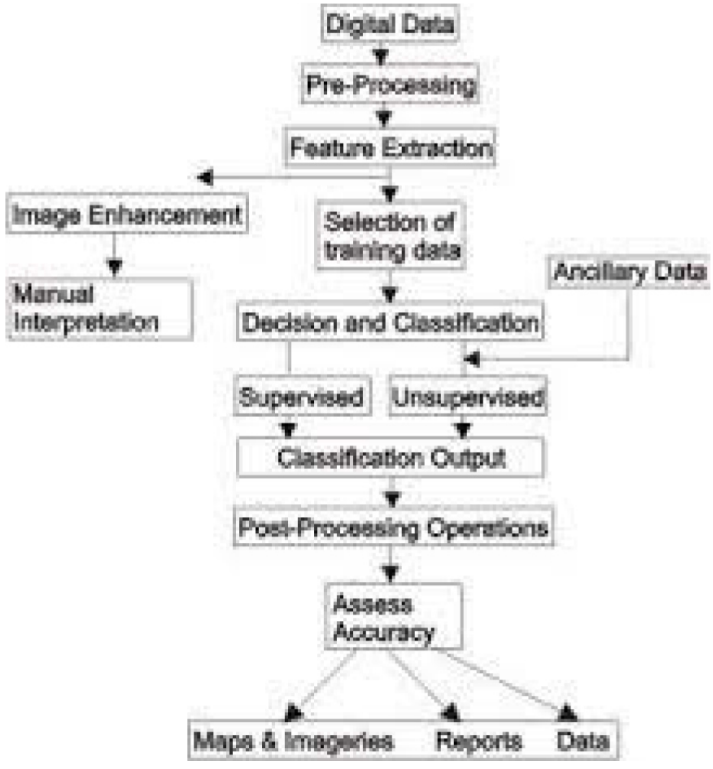
Very few researchers' have them in mind and provid their continuous works for such people. Communication is th most important part of life. Around 1% of the total populatio of the world is suffering from hearing impairment, and thei life is not as simple and easy as it is for human withou limitations..

Finding an experienced and qualified interpreter ever time is a difficult work and also unaffordable. Moreover people who are not impaired, never try to learn sign languag for interacting with the impaired people. This becomes a caus of isolation of the impaired people. But if the system can b programmed in such a way that it can translate sign languag to text , the difference between the normal people and th impaired people can be reduced.

Closely related with image processing are compute graphics and computer vision. In computer graphics, image are processed from physical models of objects and lighting instead of being acquired (via imaging devices such as vide cam, cameras) from natural scenes, as like in most animate movies. Computer vision, on the other hand, is considered a the high-level image processing out of which machine/computer/software intends to decipher the physica contents of an image or a sequence of images (e.g., videos o 3D full-body magnetic resonance scans).

2. LITERATURE REVIEW

Many Different approaches have been used by different researchers for recognition of different hand gestures which were implemented in different fields. few of the approaches were vision based approaches, soft computing approaches like Artificial Neural Network, Genetic Algorithm, Fuzzy logic,



data glove based approaches, and others like Canonical Analysis, PCA etc. All approaches could be divided into three categories- Feature extraction approaches, Hand segmentation approaches and Gesture recognition approaches. Few of the appraoches have been discussed in this paper.

Many researchers [1-11] used skin filtering technique for segmentation of hand. This technique separates non-skin colored pixels from the skin colored pixels, thus extracting the hand from the background image.

Fang [12] used Adaptive Boost algorithm which could not only detect single hand but also the overlapped hands. In [13-15] external aid like color gloves, data gloves were used by the researchers for segmentation purpose. In [1][16-18] Principal Component Analysis (PCA) was used for extracting features for recognition of various hand gestures.

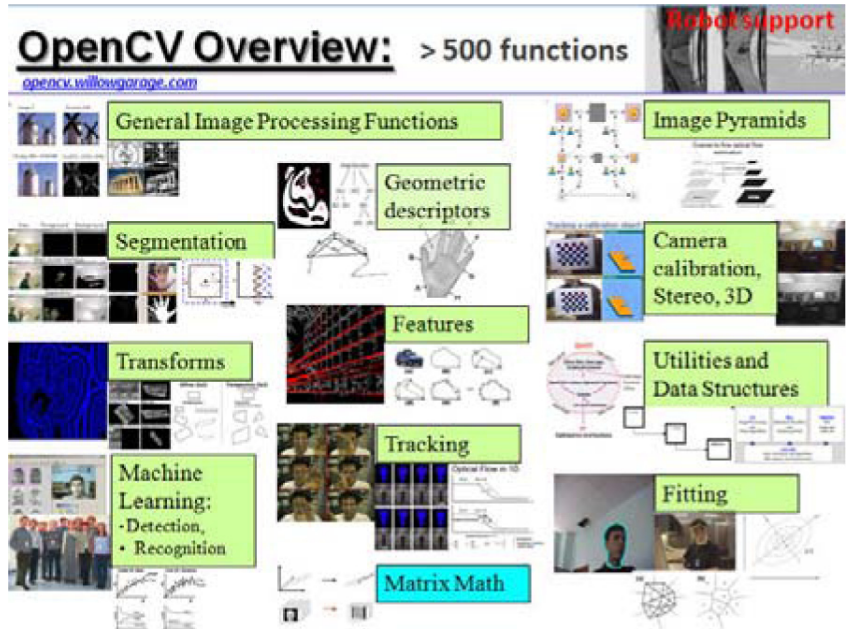
3. THEORETICAL BACKGROUND

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. It was build to provide a common infrastructure for computer vision applications and to accelerate the use of

machine perception in commercial products. As it a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

OpenCV leans mostly towards real-time vision applications. OpenCV is written natively in C++ and has a templated interface that works seamlessly with STL containers.

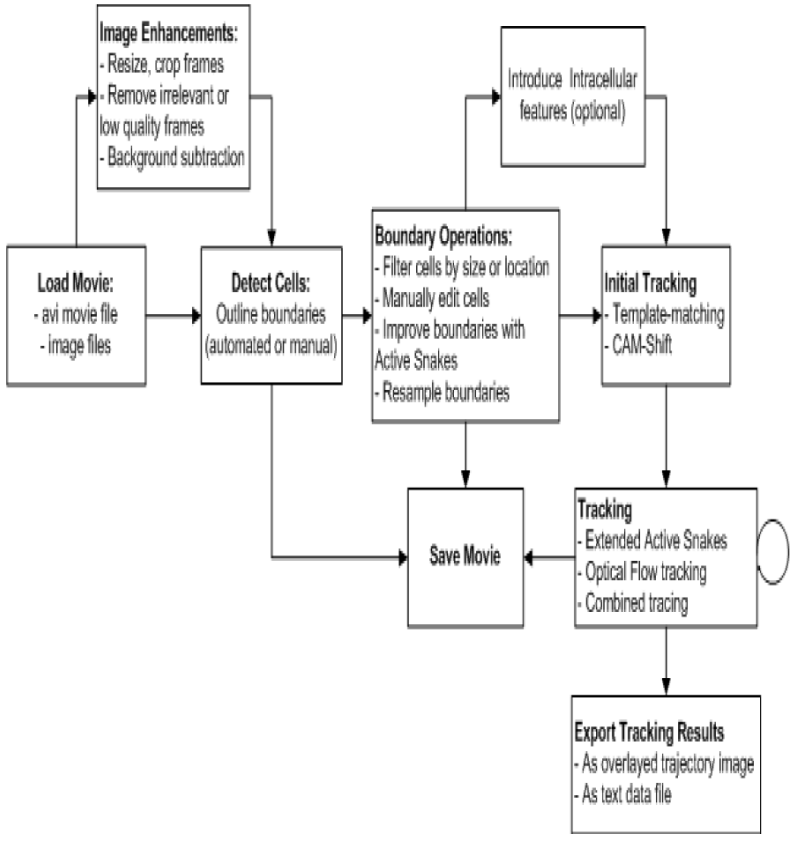
The proposed algorithm consisted of four major steps which are namely Image Acquisition, Feature Extraction, orientation detection and Gesture Recognition which is also shown in the below given Fig



4. METHODOLOGY

4.1 Image Acquisition

The first step of Image Acquisition is of acquiring an image during runtime through integrated camera and while acquiring these images will be stored in the directory after they are captured and the recently captured image will be acquired and that image will be compared with images stored for specific letter in the database using the SIFT algorithm and the comparison will give the gesture that was done and the translated text for the following gesture. The images will be captured through basic code of opening a web cam through OPENCV and then capturing the image through frames per second which will



be stored in another directory where all the inputs images are stored in another directory and the recent captured image is picked up and the comparison with given set of images are made.

4.2 Feature Extraction

For any of the object there are many features, interesting points on the object, which can be extracted to provide a "feature" description of the object. SIFT image features gives a set of features of an object which are not affected by many of the complications experienced in other methods, like object scaling and rotation. SIFT approach, for generation of image feature, takes a picture and transform it into a "big collection of local feature vectors". Each of the feature vectors never changes to any of scaling, rotation or translation of the image. To extract such features the SIFT algorithm applies a 4 stage filtering approach [19]

4.3 Orientation Detection

In it, will take the input of hand movement in any of the form or any orientation the gesture will be detected by the described section of feature extraction as the SIFT algorithm also includes the orientation assignment procedure.

4.4. Gesture Recognition

Finally when the whole process is complete the application will be then converted into its recognized character or alphabet from the gesture which might be helpful to be understood in layman's language. The following process contain passing out the 1- dimensional array of 26 character corresponding to alphabets has been passed where the image number stored in database is provided in the array.

5. CONCLUSION

The system will provide an interface that can easily communicate with deaf people by Sign Language Recognition. The system is not only can apply in family environment, but also can apply in public. For the Social use these system is very helpful for deaf and dumb people.

We will build simple gesture recognizer based on OpenCv toolkit and integrated it into Visionary framework. As a yes gesture we will mark up and down hand motions no matter which hand is used.

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