Classifying the Fingers to Recognize Hand Gestures by using Open Source Computer Vision

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Abstract - *Hand gesture recognition system is used for interfacing between computer and human using hand gesture. This project is a combination of live motion detection and gesture identification. Also a combination of stored image and gesture identification. This application uses the webcam to detect gesture made by the particular user and perform basic operations accordingly. The user has to perform a particular gesture. The webcam captures this and identifies the gesture, recognizes it (against a set of known gestures) and performs the action corresponding to it. In this process take a binary threshold value for the gesture identification. And neural network is used for the classification process. Using this we can help deaf people. This will be taken as real time applications.*

Key Words: *Gesture, webcam, threshold, neural network, Classification.*

1. INTRODUCTION

Gesture recognition is a type of perceptual computing user interface that allows computers to capture and interpret human gestures as commands.

Gesture recognition is an alternative user interface for providing real-time data to a computer. Instead of typing with keys or tapping on a touch screen, a motion sensor perceives and interprets movements as the primary source of data input. A camera feeds image data into a sensing device that is connected to a computer. The sensing device typically uses an infrared sensor or projector for the purpose of calculating depth. Specially designed software identifies meaningful gestures from a predetermined gesture library where each gesture is matched to a computer command. The software then correlates each registered real-time gesture, interprets the gesture and uses the library to identify meaningful gestures that match the library. Once the gesture has been interpreted, the computer executes the command correlated to that specific gesture.

Microsoft is leading the charge with Kinect, a gesture recognition platform that allows humans to communicate with computers entirely through speaking and gesturing.

2. Hardware Requirements

A computer with processor Intel i3 or above and minimum ram capacity of 2Gb is required for smooth and fair operation of the project

Figure 1: Computer

Web Camera

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. In case of a laptop it is inbuilt for most of them.

Figure 2: Web camera

3. Software Requirements

We have designed this project on windows environment and coding required is done in python programming language .There are also some open source libraries used in the project which are shared.

Python:

Python is an object-oriented, high level language, interpreted, dynamic and multipurpose programming language .Python is easy to learn yet powerful and versatile scripting language which makes it attractive for Application Development.

Numpy :

Numpy is numerical python. Numpy is a free open source library. It is used for numerical calculations. Whatever we give input like (text, image, table) the output comes in 2D image format. In case if we want to develop in 3D image format also, we will obtain it by using this module.

Open Cv:

OpenCV was designed for computational efficiency and with a strong focus on real- time applications. Adopted all around the world, OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 14 million. Usage ranges from interactive art, to mines inspection, stitching maps on the web or through advanced robotics.

Tensor Flow:

Tensorflow is an end-to-end open source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries and community resources that lets researchers put the state of art in ML and developers easily build and deploy ML powered applications. In the real time environment Tensor Flow is trained dataset .I have to develop tensor flow package using hand Gesture classification is very clear by using tensor flow. Because it is a trained data set in the real time projects.

4. System Implementation

Implementation is the stage where the theoretical design is turned into working system. The most crucial stage is achieving a new successful system.

❖ Data set collection of hand gestures

❖ Importing necessary packages and modules.

❖ Training by using neural network classification.

❖ Feature extraction of test hand by numpy module.
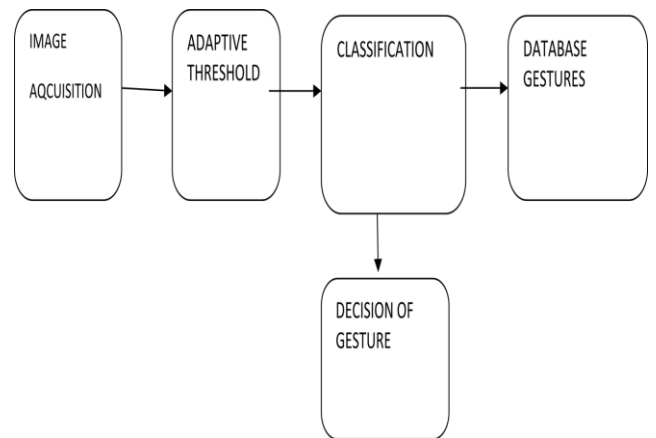
❖ Gesture classification and showing related text message.

Figure 3: Implementation of model

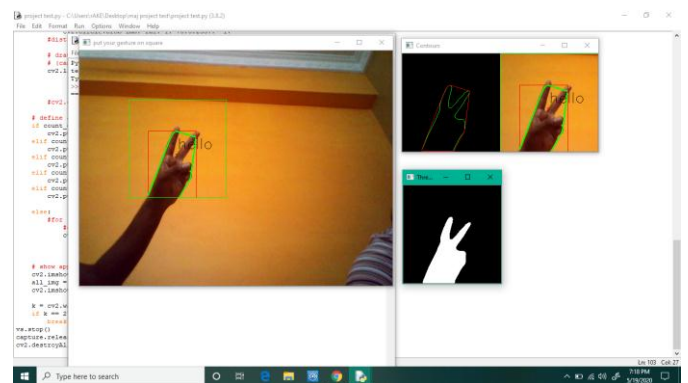**Sample Gestures and Output:**

Figure 4: Output

Here we have given a gesture (two) and the system processes the given gesture through a trained algorithm and finally the output is displayed as "hello". We can display any kind of message for a particular gesture we want to give.

5. Advantages

• Classification of gesture is clear.

• Fast and Easy to give inputs.

• Reliable

• Accuracy of the images is high compared to other methods.

6. Disadvantages

• Sufficient light must be present to acquire the clear image of hand.

• Accuracy will be low if we take more number of gestures.

• We are getting clear images only if the background color is plain.

7. Conclusion

The project mainly focuses on gesture recognition using signs of the images. This is mainly useful for the deaf and blind people. In our project Thresholding is done first then it is followed by adaptive thresholding and neural network classification. Input layer is first chosen that is we take hand image as input layer. Then it is processed by hidden layer for checking classification. Finally it is processed to output layer .The output layer will get certain output based on the gesture recognition and also the coding developed on stored gesture specification in the wamp (database).

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