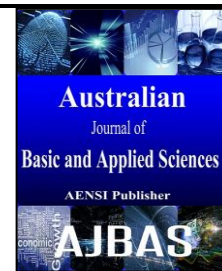




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Interaction with Deaf and Dumb Person Using Android

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ABSTRACT

In our paper, an Android application is deployed which helps to communicate the Deaf and Dumb person with the normal person. Hand gesture recognition is a popular way of interacting humans with machines. In this paper for image acquisition android camera is used in which the disabled person will show their HAND GESTURES to the Android Camera after that are sent to the server. The server processes the hand gestures by using in which the input gestures are resized to the default size of the training samples in the server and the input gestures are compared to the training samples based on shape based features by keeping in mind that shape of human hand is same for all human beings except in some situations based on PRINCIPLE COMPONENT ANALYSIS ALGORITHM. If the input gesture matches with the trained sample then the Server transmits the corresponding digital values to the Android application of the device. Finally the application plays the corresponding prerecorded audio file to the normal person through message alert. Thus the communication takes place between the deaf & dumb people and normal person.

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INTRODUCTION

Among the set of gestures intuitively performed by humans when communicating with each other, pointing gestures are especially interesting for communication and is perhaps the most intuitive interface for selection. They open up the possibility of intuitively indicating objects and locations, eg., to make a robot change direction of its movement or to simply mark some object. This is particularly useful in combination with speech and recognition as pointing gestures can be used to specify parameters of location in verbal statements.

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines. It enables humans to communicate with the (HMI) and interact naturally without any mechanical devices. There has been always considered a challenge in the development of a natural interaction interface, where people interact

with technology as they are used to interact with the real world. A hand free interface, based only on human gestures, where no devices are attached to the user, will naturally immerse the user from the real world to the virtual environment.

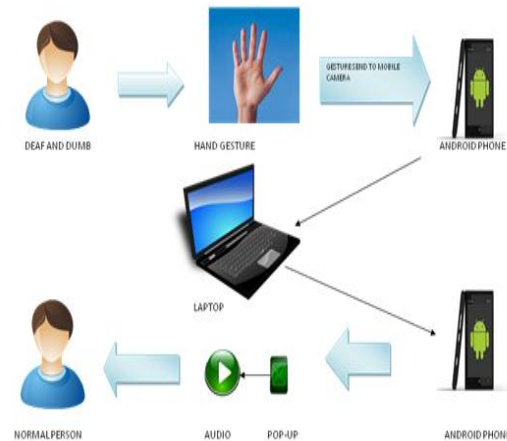
- Android device brings the long-expected technology to interact with graphical interfaces to the masses. Android device captures the users movements without the need of a controller. In our paper, an Android application is deployed which helps to communicate the Deaf and Dumb person with the normal person. The disabled person will show their HAND GESTURES to the Android Camera which in turn communicates with the Server. The Server can connect to mobile client through GPRS or BLUETOOTH TECHNOLOGY. The Server will monitor mobile clients' access and provide appropriate response to client request information. Also the Server will prevent unauthorized user in accessing it. The Server will process the given INPUT hand gestures and transmits the corresponding digital values to the Android application of the normal person. Finally the corresponding prerecorded audio file is played to the normal person through message alert.

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In the existing system a wearable gesture sensing device (embedded with a 3-axis accelerometer and 4 SEMG sensors) is used to capture the gestures. An interaction application program is developed for the mobile device to realize gesture recognition. Bayes linear classifier and dynamic

time-warping algorithm are used to manipulate mobile device. Fusion of SEMG (surface electromyography) and Accelerometers are used.

I. Architecture Diagram:



This architecture diagram clearly illustrates the interaction with deaf and dumb people in which deaf and dumb people shows the hand gestures to the android phone and the camera capture those images and send to the server and the server process those hand gestures and send the corresponding values to the android phone and the android phone sends the corresponding voice playback to the normal person.

III. Acquisition of Hand Gestures:

Mobile Client is an Android application which created and installed in the User's Android Mobile Phone. So that we can perform the activities. The Application First Page Consist of the User registration Process. We'll create the User Login Page by Button and Text Field Class in the Android. While creating the Android Application, we have to design the page by dragging the tools like Button, Text field, and Radio Button. Once we designed the page we have to write the codes for each. Once we create the full mobile application, it will generated as Android Platform Kit (APK) file. This APK file will be installed in the User's Mobile Phone an Application. The application is used to capture hand gestures through camera after that an application page will be appeared in which we have to enter the mobile number of the person for whom we have to communicate and there will be another field in which we have to enter the ip address of the system which we going to use it as a server which contains trained samples after entering the required information the captured images are automatically send to the server and another copy of the captured image is stored in the android phone. The transmission of captured images to the server is possible if it is connected via either GPRS or BLUETOOTH. If we connected via Bluetooth the transmission is possible only within the small range and if we connected via GPRS then the

transmission is possible without the need of server to be in the small range.

IV. Gesture Recognition & Comparison:

In server Database is created for different images. The images are labelled using integer numbers starting from 1 which are called as training samples. After receiving the captured images from mobile the image comparison is done by using following methods.

Subtraction Method:

This method involves converting all the images into black and white. It involves a simple subtraction between two images.

Feature extraction:

A very important step in gesture recognition is feature extraction. After extraction of features it is given as an input to the classifier. If the segmentation is done perfectly it produces features that play important role in recognition process. In feature extraction first we have to find edge of the

Segmented and filtered image. We come to know about boundaries of different objects due to edge. Edge can be said as sudden change in the intensity from one pixel to other pixel. Edge detection leads to reduction in some amount of data but same shape is maintained.

Principal Component Analysis:

It is a useful statistical technique developed for regression, reduction of dimensionality, and noise reduction.

We can use PCA to compute and study the Eigenvectors of the different pictures and then to express each image with its principal components (Eigenvectors). It is a way of identifying patterns in

data, and expressing the data in such a way as to highlight their similarities and differences. First of all, we had to create the data set. The aim is to choose a good number of pictures and a good resolution of these in order to have the best recognition with the smallest database. Then, the next step is to subtract the mean from each of the data dimensions. The mean subtracted is simply the average across each dimension. The step three is to calculate the covariancematrix of the database. We could not calculate the covariance matrix of the first matrix, because it was too huge. So we had to find a way to find out the principaleigenvectors withoutcalculating the big covariance matrix. The method consists in choosing a new covariance matrix.

Our covariance matrix for A was called C and C is defined by [13]:

$$C = A * A'$$

The Eigenvectors and the Eigenvalues of C are the principal components of our data set.

The PCA Algorithm:

Following are steps involve;

Step 1: Column or row vector of size N2 represents the set of M images (B1, B2, B3...BM) with size N*N Step 2: The training set image average (μ) is described as

Step 3: the average image by vector (W) is different for each trainee image

$$W_i = B_i - \mu$$

step 4: Total Scatter Matrix or Covariance Matrix is calculated from Φ as shown below:

$$\text{where } A = [W_1 W_2 W_3 \dots W_n]$$

Step 5: Measure the eigenvectors UL and eigenvalues λ_L of the covariance matrix C.

Step6: For image classification, this feature space can be utilized. Measure the vectors of weights

$$\Omega T = [w_1, w_2, \dots, w_M]$$

Where by, $H_k = U_k T (B - \mu)$, $k = 1, 2, \dots, M'$ basis is chosen and so the small variations in the background are ignored automatically .

Thus the image comparison using PCA algorithm.If the image is matched with thetraining imagethen the server transmits the corresponding voice is returned to the android device.

V. Voice Playback:

The prerecorded audio files for the corresponding digital values are sent to the deaf and dumb people'sdevice .In deaf and dumb people's device the guardian number is stored in which the voice is send automatically to that number as a link. After receiving that link in the normalperson device the audio file get downloaded and played to the normal person thus the communication takes place between deaf &dumb people and normal person.

VI. Gestures:



VII. Conclusion and Future Work:

The paper is useful for the deaf & dumb person to meet their daily needs by communicating with the normal person. The system database has sign gestures of size of 176X144 pixels so that it takes less time and memory space during pattern recognition.The performance can also be enhanced by providing different gestures.Thus our paper provides better user convenience and flexibility to the users.

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