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An educational and speech application for Android to translate Arabic and English sing language into text and versa

Abstract

Self-expression and what a person supports to say is one of the most important things that are considered essential for living and socializing with others in society, but there is a group of society called the term deaf and dumb.

They lack self-expression, as well as speaking and communicating with others, and this is a real dilemma of life's dilemmas facing them, as well as the other group in society facing the same dilemma by its difficulty in dealing and communicating with this group as these people depend on a kind of language of hand gestures to communicate and understand with others. It is necessary to intervene and make an Android application that works to create an interactive platform that translates sign language by capturing video images of gestures the hand of the deaf and dumb and converting it into an understandable text, as well as this application is an educational application where it transforms the text into a group of movements represented by hand gestures through a three-dimensional stereoscopic in the form of a three-dimensional hologram with a dictionary of sign language, which facilitates interaction and communication between the two groups.

Keywords

sing languages, andirod, tranlation, 3D avatar, image processing, Hand gestures

I. INTRODUCTION

Previously, deaf and dumb people were taught in the traditional way and they found it difficult to learn to read and write in this way, and therefore an educational system was proposed and at the same time a communication system between ordinary, deaf and dumb people. Others easily, which causes them a lot of frustration and contributes to the exclusion of their psychological state, and to overcome these difficulties it was necessary to have a mediator who works as a translator between people where there are 5 percent of the world's population who cannot hear or speak. So there is sign language for communication between them ،there are more than 135 different sign languages around the world, including Arabic, English, Spanish ... etc. To solve this problem, we suggest an Android app to translate English and Arabic sign languages into text and vice versa. It will be implemented by image processing, Java language and STUDIO Android Studio.

To explain the work of the communication system, the phone camera is used to take pictures, then process them and compare them with what is in the database, then verify the validity of the data and then show the text in the user interface, and if it is not found in the database, a proposal is made to add it to the database, and for the educational system The text is entered and the Blender program creates three-dimensional movements, which provides for the use of a virtual human to visualize the movement of sign language, and there is also a dictionary that includes the basic things in the unified sign language at all.

II. RELATED WORK

For normal people and to solve this problem, hope is looking for people who struggle with difficult communication with people who are difficult to communicate with in this problem

Al-Khalifa, H. S. (2010, July) proposed The idea of a portable Arabic sign languagetranslator for mobile phones to convert written Arabic text into animations in sign language using the symbolic image for the three-dimensional sign. This will enable people with hearing impairment to use J2ME, which is an abstract version of Java as the system consists of two processes, namely translation and presentation, Also, in the process of presentation and animation, we used the coordinate technology to move the 3D signal glyph to the Mobile 3D Graphic API as this technology is suitable for mobile memory limitations. Finally, we conclude that the main users of our system are people who suffer from hearing disabilities as well as non-deaf people interested in learning sign language.Arabic [1].

Al-Nafjan, A., Al-Arifi, B., & Al-Wabil, A. (2015, August) presented in this study various approaches for recognizing hand gestures instead of speech without the aid of any signs and leaps. The alphabet will be recognized from A to Z using the SIFT algorithm One of its advantages is the speed of processing to bring better results. This algorithm follows the correct matching of key points between different hand gestures. Of the stages of designing the proposed system Dataset Collection: Generate app dataset for no video data for Hindi Sign Language words Video preprocessing: Converting video clips into frames and considering each picture frame as input to the system Segmention or Region of interest: This segmentation is used to find the hand area of the entire image, remove noise from it and convert it into a gray scale image and then a binary image Histogram Matching The histogram is matched.Feature Extraction is used to output individual specific features for each tag from a hand image .Classification: Used to recognize various gestures from hand gesture[2].

Lahoti, S., Kayal, S., Kumbhare, S., Suradkar, I., & Pawar, V[3]published an Android app that converts ، American Sign Language to text, YCBCR works to break down pig-skin to extract features from images. Classification was performed using a vector machine Support (SVM), and the results also showed that the accuracy of this system is 54٪

Eqab, A., & Shanableh, T. (2017, November)[4] presented An Android application for .. real-time translation of the Arabic binary language, as the application is designed to work on isolated sign language words. The application contains 4 basic components picking up sign language for translation, picking up sign language for training, audio for signing the translation language, and a game for testing sign language where the process of taking sign language words is performed by a portable jump controller connected to the USB to the phone through the OTG mobile. Also use the mean approach, variance, covariance, and classification approach. And the results of the classification that was made with 15 words in a different language. Where the experimental results reached that the rating was excellent achieved for 10 language words of 98.7% respectively. Future study We want to extend the proposed solution in the study with continuous language sentences

Oliveira, T., Escudeiro, P., Escudeiro, N., Rocha, E., & Barbosa, F. M. (2019, April)[5],proposed Demonstrate the current structure and improvements of the virtual sign platform, which is a bidirectional sign language, as this platform is divided into two main parts. It is also different by using graphic processors with modern computers, and the vision for the future is to progress from a basic translation to a more flexible translation process, as well as developing the sign language grammar component to try to define the grammar rules and sentence construction that can be applied to improve translation accuracy.

Soewito, B., Satyadhana, AK, & Maria, S. (2020, August)[6]،introduced an Android application that converts hand gestures into text to enable deaf and dumb people to communicate with people using artificial intelligence, image processing and ANN via the camera, the results showed that the accuracy of the system In gesture translation it is 87%.

Alobaidy, MA, & Sundus, KE (2020) presented an Android application to translate Iraqi Sign Language into Arabic text and vice versa using "STUDIO Android Studio" as a development environment. The programming language used Java Micro Edition for easy handling in Android devices, a 3D design program "Blender" was used Which is considered an effective way to store images with less storage space, and an educational system was obtained without using the Internet, easy to use anytime and anywhere[7].

Saleh, BM, Al-Beshr, RI, & Tariq, MU (2020) developed a D-talk system that allows the deaf and mute people to communicate with others through detailed hand gestures, using machine learning technology to develop the computer's ability to learn, and deep learning technology that used an algorithm. The neural network that works to solve complex problems, the Image recognition process technology was used that works to process the sign language entered into the application. The results showed that the system is efficient and effective. When the user signs a gesture, the result is that the system determines the relationship that represents the website , Hash accuracy was 60% for every ten gestures, 6 of which were correctly identified[8].

III. PROPOSED SYSTEM

An Android application has been proposed to translate Arabic Sign Language and English Sign Language into texts, and it also contains an educational system for converting Arabic texts and English texts into a sign language through a three-dimensional hologram where the algorithm shown in Figure [1] is followed.

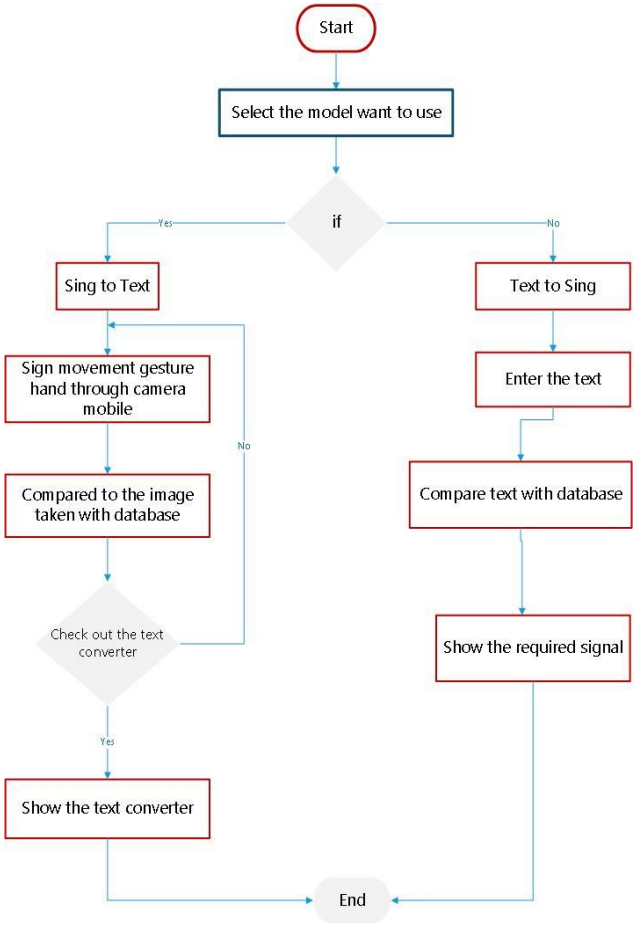

Figure [1]

Android is a platform produced by Google.lnc which is installed on many devices and as it supports tablets, phones and other devices. In this study we used the Java 8 language, which is the most used and common programming language and for ease of dealing with it in creating new applications and it was chosen because android uses java in collaboration with android studio as a development environment to produce applications that run on devices managed by Android as operating systems.

TEXT TO SING

- ***General overview***

In this system, we have a unified dictionary for basic Arabic and English to teach Arabic and English sign language, where the text required to learn the movement of its sign is entered in the text box, and then the text is compared to the database and then hand gestures are displayed by a virtual person.

- ***Blender***

It is launched under the General Open Source (GNU) license which is used to create 3D movies, movie tricks, interactive 3D software, and video games. This program provides the ability to use a virtual human to visualize sign language movements and then store glyph images in the application's database for use in the translation process.

- ***Data processing***

data processing data processing is the first step to build a model of the learning deep data collection and capture images using the camera to implement the proposed system is capture images in accordance with the following 1- of different angles 2- way to change light conditions 3- with high quality and accuracy in focus 4- change the size and a target the purpose of the pictures of primary is a data set the test and training of the system as in figure 2 shows the US codes characters alphabet Arab and English.

- ***Database***

There are many fields in the database. In the first field "Word", numbers, letters and words are stored. The second field, "IMG_NAME", contains the image names that match the words. The third field "Categories" contains the category names, and the fourth field "Additional_img" contains the names of the added pictures that express the direction of movement. When the user clicks the "translate" button, the application searches the database separately for the names of the images that match each word. Images are displayed by the "IMG_NAME" field. The process of searching and matching the word continues, and then the image display function is called until the end of the sentence is reached.

- ***Images display***

The images from the database are displayed by programmed functions that have two factors. The first factor is a string of characters that represent the name of the image, and the second factor is numerical values that represent the display speed. Where these functions display images of movements of hand gestures (sign language) by a virtual human.

SING TO TEXT

- ***General overview***

This system is used to help the deaf and dumb people to communicate through social networking sites, where the conversion is done from signal to text by taking a picture of the movement of the hand through the phone's camera. The data or not, and if it is not present, the image is taken again,

and if it is present, the reference is converted to text, and finally the text is shown in the text box.

- ***Image Segmentation***

The process of dividing digital images into parts and the goal is to simplify the image into something more important and easier to analyze [9], Among its applications is to locate tumors and other diseases, as it was used to convert an RGB image as shown in the figure[2],first, the gray scale image for one channel. In this image, the canny edge detection to create strong edges present in the image only, where a multi-stage algorithm is used to distinguish the sharp edges, and this helps reduce background noise. So that other techniques can be applied effectively.

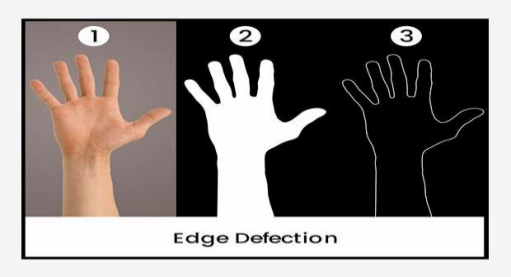

Figure [2]

- ***Feature Extraction***

In this technique, the ORB shown in Figure [3] was used to discover and extract features, where ORB is a good alternative to detect and match SIFT or SVRF features, and to enhance performance, the FAST Keypoint detector is used, where this technique calculates the adjacent main points in the direction that is calculated from a certain angle to The middle point is more accurate, so ORB uses a multi-scale image pyramid because the orientation is not part of FAST's features and the BRIEF algorithm is used to smooth the image with Gaussion to reduce the noise sensitivity.

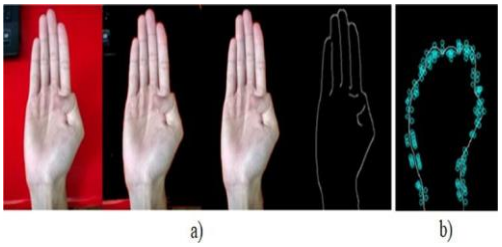

Figure [3]

- ***Classification***

We need a SLR classification to classify inputs in various categories of the training database. The concentrated training is used for training worked during the training process. At a point, the test inputs are presented as the coach workbook is determined on tags shows or audio games. Also as possible to enter the test data by video or video clips. Where the most common works in CNN, RNN, HMM, ANN, SVM systems, KNN and others. The workbook performance is estimated by the recognition rate.

IV. FUTURE WORK

In our future work, we plan to complete this research, we propose in future studies to implement this proposed system as an Android application with the possibility of adding the feature to recognize the feelings of deaf and dumb people through facial expressions.

V. CONCLUSION

The proposed system between the deaf and mute groups and the common people aims to solve the problem of difficulties in communicating and communicating with each other in our society. As there are many researches reached in this field, but this paper is based entirely on the proposal of an Android application that creates an educational system for ordinary people and deaf and dumb people to learn Arabic and English sign language by entering the text to learn the gestures of the hand or to be communicated To the person you are talking to via the Blebder program

And the creation of a communication system that converts (translation) sign language into texts by processing images, by making an Android application in the Java language, STUDIO Android Studio,Featurr Extraction, data process,detection detection languge recognition.

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