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A Sign Language Based ATM Accessing System for Visually Impaired

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Research Article

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Abstract: The blind community often has trouble using ATMs to take out cash, forcing them to go to the bank. They are often inconvenienced by this. Despite the availability of Braille-inscribed keypads to facilitate their usage, most people with disabilities who may not be literate in Braille do not use these devices. What happens, however, if individuals are unaware of how to enter a card? Someone else may find out his pin number, or the companion who is going with him may learn the password. A stranger may attempt to gain the blind's confidence in order to rob him. Therefore, this research proposes a sign language-based access system as an alternative.

Keywords: ATM; ASL; Hand gesture; Earpiece; Text-to-speech; Sign language.

INTRODUCTION

There are around 35 million blind persons and 285 million visually impaired people worldwide. There are many types of blindness, including color blindness, limited vision, full blindness, and night blindness. With the aid of technology, there will be a solution for everything, including the creation of electronic wheelchairs, canes, navigation assistance systems, etc. Numerous devices have been created and are still being developed with the use of technology to benefit people, especially those with physical disabilities. Making financial transactions is one of the biggest challenges for people with physical disabilities. The current option for transactions is an automated teller machine called a "talking ATM," which helps blind people who can't see what's on the screen use the machine on their own by speaking instructions to them. Speech will be used to convey the information, and it will be delivered securely via an earpiece or regular headphones. The individual receives information either via text-to-speech or pre-recorded audio files. When a regular earpiece is plugged into the jack, instructions like "press 1 for deposit" and "press 2 for withdrawal" are audible. Although it seems useful, blind people may encounter the following issues with certain kinds of ATMS:

a) Having trouble locating the slot for inserting a card.

b) Searching the keypad to type the command is challenging.

c) Braille is engraved on keypads to assist the blind in choosing his selections. However, if the blind user is illiterate in Braille, these keys may be considered worthless.

We thus intended to create a safe atmosphere for them by creating an ATM access system based on sign language in order to make using the ATM easier. This project's security feature would be to notify the user if there was an intrusion while using the ATM.

LITERATURE SURVEY

A.“A.“Sign language recognition using template matching technique” by Soma Shrenika, Myneni Madhu Bala.

Indian Sign Language uses both the right and left hands to depict a variety of hand gestures. The planned study focuses on American Sign Language

and hand form and orientation. ASL is only used with one hand. As a result, the system's implementation becomes simple. ASL has its own developmental trajectory and is independent of all spoken languages.

In a nutshell, the procedure involves taking pictures using a camera. After that, the picture is subjected to pre-processing procedures, which include converting the obtained RGB model image to grayscale. Afterwards, use a clever edge detection technique to follow the edges. Ultimately, a template-matching algorithm is used to identify the pattern, and the result is output as text.

This technology eliminates the need for an intermediary translation by bridging the gaps between deaf and non-deaf persons. The goal of translating hand motions into text is accomplished.

The system's limitation is that it only makes use of American Sign Language. We can enhance electronic systems' decision-making capabilities and optimize them using machine learning algorithms. CHC was the best suitable method for choosing prototypes based on sensor data. The classifier's performance and training set reduction capabilities are to blame for this. Additionally, this algorithm's primary benefit is that it works in the R environment. Regarding the prototype's selection, just 2% of the massive amount of data collected for the model is needed to train it with an accuracy of 85%.

In order to discover the optimal training set (with the least amount of data) from sensor data in an SL electronic system, the current study provides an intelligent glove as a first attempt. The information about the numerals 1 through 10 in SL is obtained from a deaf person's right-hand glove. A k-NN method is used as a classifier to determine each SL number. The following steps in the approach are as follows: (i) the system requires a data balance (Kennard-Stone) to store the equal amount of samples of each number; (ii) the best PS algorithms taken into consideration, DROP 3 and CHC, are compared to decide which is appropriate for our data set. Principal Component Analysis (PCA) is then used to reduce dimensionality in order to validate the findings and graph them. in order to see the clusters that emerged from the prototype selection process. The k-NN technique is used as a classifier in the last step (iii).



The glove system's disadvantage is that it makes it difficult to maintain hygiene and increases the risk of skin diseases spreading.

Hand gestures may be used by visually challenged persons to write text on electronic documents such as Microsoft Office and Notepad. Additionally, almost all deaf and dumb persons use various hand forms to communicate with one another. In a similar vein, computer vision would enable a visually handicapped person to use a computer. This approach's strength is how simple it is to use; it doesn't need a lot of post-processing or training, and it gives us a greater recognition rate with the least amount of calculation time.

The disadvantages of this approach include the fact that we classify certain hand gestures as essentially a person's physical movement used to transmit significant information. In order to develop an intuitive and more practical method of interaction, a gesture recognition system is designed to give these hand movements a unique tag of interpretation after recognition and categorization. The use of hand gestures as a new input modality in computer vision applications is highly valued. A unique interface to the computer system might be provided by a hand gesture that uses various hand forms, orientations, or finger patterns to express concepts and activities. The gesture recognition system would then analyze the gesture and produce a matching event. The core of immersive virtual worlds is this kind of interaction.

Since there is no systematic method for gesture identification, threshold values are determined empirically, and the maximum parameters used in this method are predicated on assumptions established after examining a variety of pictures.

METHODOLOGY

We suggest creating a mechanism for ATM system access that is based on hand gestures. The user must demonstrate to the camera the movements that correspond to the activities. The program created using computer vision principles must recognize these gestures. and decoded into required inputs, including the account's pin number and activities. To grant access to his or her account, a final comparison where the pin number is validated must be carried out. The appropriate remarks must be made over headphones in order to help the blind. Fig. 1 depicts the suggested system's future.

Fig 1. Outlook of the system

ADVANTAGES

The Blind people need not depend on anyone for his/her transaction.

This system can be used by illiterates as well.

Even a person who does not know Braille person can easily do his/her transaction. It is a safe, error-free and cost effective.

APPLICATION

Along with using this system for ATM access, this can be used for

Accessing safe lockers

Home automation to switch on/off lights.

Each number can be assigned a direction to create a gesture driven car.

Signs can be used to create an SOS system in cockpits in airplanes, in case of hijacks.

CONCLUSION

The ATM system will take the appropriate action based on the hand motion shown. Additionally, in the event of a security breach—that is, if someone approaches the ATM while it is in use—the buzzer will sound to alert the user.

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