

A Sign Language Based ATM Accessing System for Visually Impaired

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Abstract: *The blind population often face difficulties in accessing ATMs to withdraw money which forces them to visit bank. This often cause inconvenience to them. Though Braille inscribed keypads are provided to easier their use, usually impaired who might be braille-illiterate fail to use these systems. But what if people don't know to insert a card? The friend accompanying him might get to know the password or someone else can come to know of his pin number. A stranger might try to help the blind win the trust and rob him. Hence, as an alternative a sign language based accessing system is proposed in this project.*

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

I. INTRODUCTION

In world about 285 million people are visually impaired and approximately 35 million are blind. There are different kinds of blindness they are like night blindness, complete blindness, low vision and color blindness. For everything there will be a solution with the help of technology, from development of electronic wheelchairs, canes to navigation guidance systems, etc. With the help of technology, many equipment have been developed and till developing to serve humanity, including for the physically challenged. For physically challenged person the main problems faced by them is performing monetary transactions. Existing solution for transaction is-talking ATM is an automated teller machine which provides instructions to the person in the form of speech for the blind person who is unable to recognize what is present on ATM screen, to help him to

use the machine independently. The information will be in the form of speech which will be given with secure through a standard headphone or the Earpiece. Information is given to the person either will be in the form of pre-recorded audio files or via through text-to-speech construction. A person plugs a standard Earpiece into the jack and can hear an instruction such as “press 1 for deposit”, “press 2 for withdrawal” etc. Though sounds helpful the problems where blind person can face from these types of ATMS are:

- Difficulty in finding the card inserting slot.
- Difficult to search keypad to enter the instruction
- Keypads are embossed with Braille to help the blind select his options. However, these keys can be deemed useless if the blind users an illiterate with respect to the Braille language.

Thus, in order to ease the use of the ATM, we planned to develop a secure environment for them by designing sign language-based ATM accessing system. The security aspects of this project would be to alert the user in case of an intrusion while operating the ATM system.

II. LITERATURE SURVEY

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

Indian Sign Language presents various hand movements by using both right and left hands. The proposed work focuses on hand shape and orientation and works on American Sign Language. When using ASL, only one hand is used. Therefore, it becomes easy for implementing the system. ASL does not depend on any of



the spoken languages and it has its own path of development.

The process in brief includes acquiring images using a camera. Then performing pre-processing steps on the image, that is, convert the acquired image, which is in RGB model to gray scale image. Later, track the edges by using canny edge detection algorithm. Finally, detecting the pattern using template-matching algorithm, this outputs the result as text.

This system bridges the imbalances between deaf people and normal people without any requirement of an intermediate translator. It achieves the objective of conversion of Hand gestures to text.

The drawback of the system is it uses only American Sign Language.

B. *“Sign Language Recognition Based on Intelligent Glove Using Machine Learning Techniques”* by Paul D. Rosero-Montalvo, Pamela Godoy-Trujillo, Edison Flores-Bosmediano, Jorge Carrascal-Garcia, Santiago Otero-Potosi, Henry Benitez-Pereira and Diego H. Paul D. Rosero-Montalvo, Pamela Godoy-Trujillo, Edison Flores-Bosmediano, Jorge Carrascal-Garcia, Santiago Otero-Potosi, Henry Benitez-Pereira and Diego H.

Machine learning algorithms allow us to optimize electronic systems and increase their decision-making ability. In reference to prototypes selection algorithms, CHC was the most adequate in sensor data. This is due to training set reduction capacity and the classifier performance. Also, this algorithm has main advantage that works with R environment. About the prototype's selection, from the large number of data acquired for the model, only 2% is used for training the model with an accuracy of 85%.

The present work presents a first approach an intelligent glove to determine the best methodology to find the best training set (less data as possible) from sensor data in SL electronic system. the data are acquired from glove on the right hand used by a deaf person to raise information of the numbers between 1 to 10 in SL. To determinate each SL number a k-NN algorithm is implemented as classifier. The methodology has the next stages: (i) the system needs a data Balance (Kennard-Stone) to storage the same number of samples of each number (ii) a comparison between the best PS algorithms considered which are DROP 3 and CHC to determine the adequate one for our data set. Subsequently, to verify results and to be able to graph them, a stage of dimensionality reduction is applied with Principal Component Analysis (PCA). In order to observe clusters resulting from the selection of prototypes. Finally, the last step (iii) is k-NN algorithm as classifier.

The drawback of the system is by using glove system hygienic will not be maintained and there will be chances of spreading of skin diseases.

C. *“Hand Gesture based Interface for Aiding Visually Impaired”* by Meenakshi Panwar.

Hand gestures are basically the physical action form by the person in order to convey some meaningful information. Gesture recognition system is thus created to provide these Hand gestures a unique tag of interpretation after recognition and classification to form a intuitive and more convenient way of interaction. There is a great emphasis on using hand gesture as a latest input modality in various applications of computers through the use of computer vision. The hand gesture which represents ideas and actions using different hand shapes, orientation or finger patterns being interpreted by gesture recognition system and generate corresponding event, has the potential to provide a unique interface to the computer system. This type of interaction is the heart of immersive virtual environments.

Visually impaired people can make use of hand gestures for writing text on electronic documents like MS Office, notepad etc. Moreover, almost all deaf and dumb people communicate with each other by forming several hand shapes. Similarly, a visually impaired person would be able to work on computer through computer vision. The strength of this approach lies in the ease of implementation, as it does not require any significant amount of training or post processing and it provides us with the higher recognition rate with minimum computation time.

The drawbacks of this method are, we define certain parameters and threshold values experimentally since it does not follow any systematic approach for gesture recognition, and maximum parameters taken in this approach are based on the assumption made after testing a number of images.

III. METHODOLOGY

We propose to develop a method wherein hand gesture based system for ATM system access. The user must show the gestures corresponding to actions must be shown to the camera. These gestures must be identified by the algorithm developed using the concepts of computer vision. And decoded into necessary inputs such as actions and pin number of the account. A final comparison must be performed where the pin number is verified to provide access to his/her account. To assist the blind, necessary comments must be spoken via headphones. The outlook of the proposed system is shown in Fig. 1.



Fig 1. Outlook of the system

IV. 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.

V. 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.

VI. CONCLUSION

Based on the hand gesture shown necessary action will be carried out by the ATM system. Also, in case of breach of security, that is if another person comes close to the ATM when in use it sets the buzzer on to intimate the user.

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