ISSN 2348 – 9928
IJAICT Volume 5, Issue 2, February 2018 Doi:01.0401/ijaict.2015.10.10 Published on 05 (2) 2018

SIGN SPEAK- A COMMUNICATION SYSTEM FOR DIFFERENTLY ABLED PERSONS

Ms. D. Lakshmi
Associate Professor

Ms. G. Jayanthi
Associate Professor

Mr. K. Gopinath
Assistant Professor

Computer Science and Engineering,
Panimalar Institute of Technology,
Chennai, Tamilnadu, India

Abstract - Communication comes in different forms, including verbal (spoken), written word, lip reading, sign language and even body language. But, the communication between the visually impaired and speech impaired people is very difficult with the present technology available. The goal of our research work is to bridge the gap between visually impaired people on one hand and hearing & speech impaired people on the other. Since the former cannot see and the latter use sign language, there is currently no means of communication between such people who are unfortunately in significantly large numbers in a country like India. Our paper aims to tide over by introducing inexpensive software in the communication path that converts the speech to sign on one hand and converts text to speech on the other hand. In addition we also provide a feature that allows our user to open files by using commands that are statically included in the project. Our research paper provides an inexpensive system which recognizes images and translates them into speech and vice versa for the benefit of people.

Keywords - Sign language, Automatic Recognition, Natural Language Processing.

I. INTRODUCTION

Sign Language is a non verbal method of communication in which gestures are made using hands. Gestures are an integral part of our day to day communication and some expressions are conveyed by gestures only. Rising of eyebrows, shrugging of shoulders, nodding of head are some commonly used gestures. Sign language is a more organized form than gestures. Various commonly used sign languages are ASL (American Sign Language), BSL (British Sign Language) and ISL (Indian Sign Language). There is no one standard form of sign language and it varies from region to region. Humans know each other by conveying their ideas, thoughts, and experiences to the people around them. There are numerous ways to achieve this and the best one among all is the gift of "Speech". Through speech everyone can very convincingly transfer their thoughts and understand each other. It will be injustice if we ignore those who are deprived of this invaluable gift. The only means of communication available to the vocally disabled is the use of "Sign Language**"**. Using sign language they are limited to their own world. Deaf- Dumb people need to communicate with normal people for their daily routine. There are some difficulties when they come across in certain areas like banking, hospital etc. To overcome their problem a proper sign language is needed other than their existing communication method like lip reading, writing down word and finger spelling. Sign language is the main technique for speech impaired communication. This language cannot be recognized by most of the normal people and visually impaired people. They face difficulties in their way of communication. To facilitate their communication, system that translates spoken language into sign language could be helpful. The developed system is the first step towards the final goal of translating spoken language to sign language via speech recognition. This system may be installed on a portable computer that acquires the speech and translates it immediately to sign language displaying it on the portable computer. The current stage of the progress focuses on translating speech signal to American Sign Language.

II. EXISTING SYSTEM

A two way communication approach is presented for the automatic recognition of sign language, where deaf-to- hearing and deaf-to-deaf communication is proposed [1]. In this approach attention is given to the requisites of picture communication systems, which enable the mute people to communicate over distances utilizing telephone lines. This section discusses some research done on translating other text and verbalized languages to sign language. A special avatar is developed for the translation of English speech in to British Sign Language (BSL). A phrase lookup approach is used due to high constraint in the Macintosh operating system. Accuracy of complete phrases is 61% and 81% for sign units is achieved. The task is divided in to three different problems:

- •Automatic verbalization to text conversion
- •Automatic translation of arbitrary English text in to felicitous representation of Indian sign language.
- • Exhibit of this representation as a sequence of designation utilizing computer graphics techniques.

An automated American sign Language Synthesizer is developed by a group of 21 researchers at DePaul University [3,4]. A system is developed to translate texts written in Polish Language into Polish Sign Language. An Avatar with a dictionary of 600 signs is used for this purpose. Speech to video clip translator system is introduced [6]. In this approach the ASL clips along with the written words are displayed using a built-in speech recognition engine in the Macintosh operating system. Speech to Spanish Sign Language translator is developed [7]. The system is made up of four modules: speech recognizer, semantic analysis, gesture sequence generation and gesture playing. A module is developed for the speech recognizer by IBM. One more module is developed for the semantic analysis by the University of Colorado. Semantic concepts are concepts associated with several Spanish Sign Language gestures for gesture sequence generation.

An animated character and a strategy for reducing the effort in gesture generation are developed for gesture animation. Automated speech recognition system for vocally disabled people is developed to recognize "Pakistan Sign Language"(PSL) at Sir Syed university of Engineering and Technology [8]. This approach aims to produce sound matching the accent and pronunciation of the people from the sign symbol passed. To transform the signed symbols to audible speech signals using gesture recognition, a wearing Data Glove for vocally disabled is designed. To interface with the computer, they use the movements of the hand and fingers with sensors. A major communication gap between the vocally disabled with common community is eliminated by this system. The main limitation is reading only the hand or finger movements neglecting the body action, which is also used to convey message. The other limitation in the system is that the finger could be able to communicate with a normal person but the vice versa is not possible with it. The approach in the paper opens the door for research of translating the speech signal to American Sign Language. An abstraction approach is reviewed in [9]. HMMs methodologies are proposed for Sign Language Recognition, Hand Gestures and Positions [10].

III. PROPOSED SYSTEM

A new system is proposed that mainly bridges the gap of reticence (reserve) between a visually impaired user and a hearing impaired user. As a part of our Sign Speak application we introduce software for the betterment of a hearing impaired user. It converts speech to text and then to sign language, where the sign output is alone directly displayed to the user. This utility serves the needs of a user who is not educated with any of the commonly used languages.

A novel and unique facility is included where the user directly from the application can train his voice to the engine, without having a need to import a speech engine manually, which proves difficult in case of systems with Windows 7 or other versions of windows that do not support this feature directly. Sign Speak serves as a complete application that serves the communication gap between any pair of users. Also it has a web browser that automatically takes user to a website with full of help line videos. Apart from serving the communication gap between users on the official front, it can also be used as a kindergarten trainer.

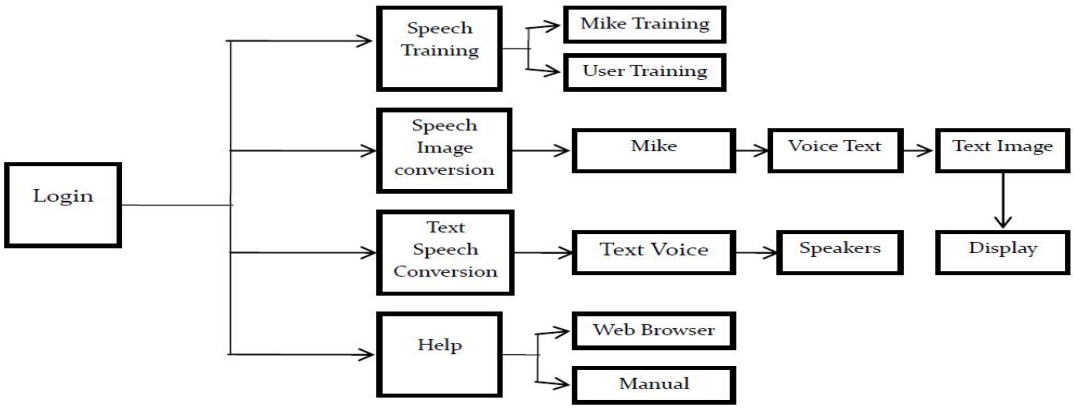

Fig 1: System Architecture

The overall system architecture of the proposed system is given in Fig 1. The entire system can be divided into four different systems. The user has to login before he can carry out any operations. Speech to Image conversion is used by the user who cannot see in order to convey his views to the user at the other end (i.e.) to the user who cannot hear. Text to speech conversion can used both by users who can or cannot hear in order to pose a reply to the person on the other side For the software to work better, a speech training section is provided, where the user can tune in the software to work better with his/her own vocal features. For further details

about sign language user can refer to the help section of the system.

3.1 Text –Speech Conversion System

This is a rule-based text- to- speech (TTS) Synthesis System for Standard Language, English. The proposed system uses sinusoidal method and pre- recorded wave files in generating speech for the system. The use of phone database significantly decreases the amount of computer memory space used, thus making the system very light and embeddable. The overall system was comprised of two phases the Natural Language Processing (NLP) that consisted of the high-level processing of text analysis, phonetic analysis, text normalization and morphophonemic module. The second phase is the Digital Signal Processing (DSP) which operates on the low-level process of the speech waveform generation. An intelligible and adequately natural sounding formant-based speech synthesis system with a light and user-friendly Graphical User Interface (GUI) is introduced. By applying the generative phonology, a comprehensive letter-to-sound (LTS) rules and a pronunciation lexicon are invented for the system. As for the evaluation tests, a set of Diagnostic Rhyme Test (DRT) word list was compiled and several experiments have been performed to evaluate the quality of the synthesized speech. The system design of Text – Speech conversion given in Fig 2.

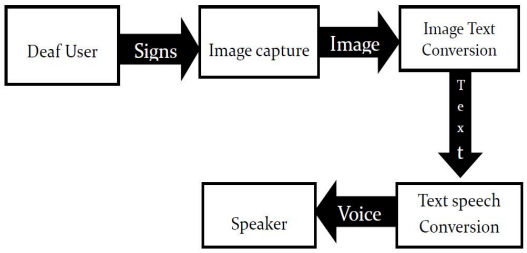

Fig 2: Text- Speech Conversion System

3.2 Speech – Text Image Conversion System

A new method of text- independent voice conversion which uses non-parallel corpus for the training is implemented. The Hidden Markov Model (HMM) is used to represent the phonetic structure of training speech and to generate the training pairs of source and target speakers by mapping the HMM states between source and target speeches. Then, HMM state mapped codebooks are generated to create the mapping function for the text-independent voice conversion. The subjective experiments based on ABX tests and MOS tests show that the method proposed in the paper gets the similar conversion performance and better speech quality compared to the conventional voice conversion systems. The system design of speech to text image conversion is given in Fig 2.

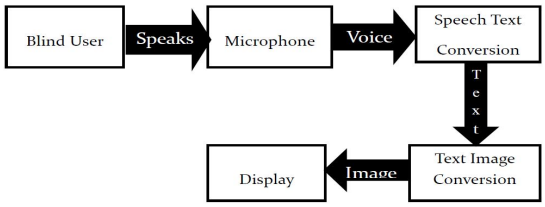

Fig 3: Speech – Text Image Conversion

IV. SYSTEM IMPLEMENTATION

The proposed system was implemented in JAVA Programming language. MySql was used as backend to store the information. The operating system used was Windows 7. The minimum hardware requirements are: Pentium IV Processor, 512 GB Ram and 20 GB Hard Disk.

4.1 Home Page

The home page of the system gives an introduction about the system. It also provides a help page for the user for better understanding of the system, so that the he/she can use the system effectively. The home page is shown in the Fig 4.

Fig 4: Home Page

4.2 Registration Form

If the user is new to the application then the user has to register their details. In this registration form Name, Age, Gender, User Mode, Username, Password details entered by the user. The registration form is shown in Fig 5.

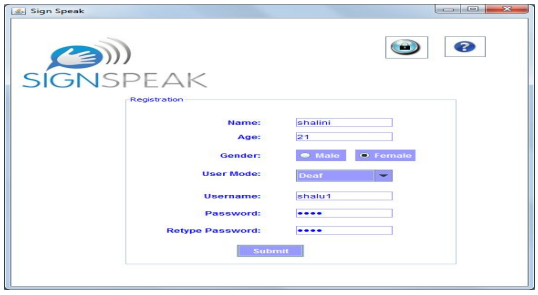

Fig 5: Registration Form

4.3 Menu Page

The Menu page gives menu details. This menu page is for speech impaired user to get there signs as images and voice format. Fig 6 gives the menu page of the system.

Fig 6: Menu Details

4.4 Greetings Page

The sign languages are shown as images and voice will be heard. The images in Fig 7 show the greetings sign language.

Fig 7: Greetings Sign Language

4.5 Text To Speech Page

This text to speech page is for the speech impaired users. They enter the message in the space given and that voice will be heard to visually impaired user. Figure 8 shows the screen shot of the implementation.

Fig 8: Text To Speech Page

4.6 Visually Impaired User Speech Regonizer Page

This page is for visually impaired users. The user logins into the system and he/she starts the chat from this page. Figure.9 shows the visually impaired user speech recognizer component.

Fig 9: Speech Recognizer

4.7 Voice to Image and Text Converter

Fig 11: Image and Text Converter

The voice message given by visually impaired user is converted to image and text format for the Deaf user.

V. CONCLUSION

This paper provides a feasible solution for the major problem faced by differently-abled persons. Communication between speech impaired and visually impaired persons is very difficult and there is no complete solution for it. This prototype model provides communication between the differently-abled persons. This prototype can be enhanced by applying more rules for its learning, which will make the system more effective.

References

[1] Donpearson "Visual Communication Systems for the Deaf" IEEE transactions on communications, vol. com-29, no. 12, December 1981

[2] Alison Wary, Stephen Cox, Mike Lincoln and Judy Tryggvason "A formulaic Approach to Translation at the Post Office: Reading the Signs", The Journal of Language & Communication, No. 24, pp. 59-75, 2004.

[3] Glenn Lancaster, Karen Alkoby, Jeff Campen,Roymieco Carter, Mary Jo Davidson, Dan Ethridge, Jacob Furst, Damien Hinkle, Bret Kroll, Ryan Layesa, 15 BarbaraLoeding, John McDonald, Nedjla Ougouag, Jerry Schnepp, Lori Smallwood, Prabhakar Srinivasan, Jorge Toro, Rosalee

Wolfe, "Voice Activated Display of American Sign Language for Airport Security".Technology and Persons with Dsabilities Conference 2003. California State University at Northridge, Los Angeles, CA March 17-22, 2003

[4] Eric Sedgwick, Karen Alkoby, Mary Jo Davidson, Roymieco Carter, Juliet Christopher, Brock Craft, Jacob Furst, Damien Hinkle, Brian Konie, Glenn Lancaster,Steve Luecking, Ashley Morris, John McDonald, Noriko Tomuro, Jorge Toro,Rosalee Wolf, "Toward the Effective Animation of American Sign Language".Proceedings of the 9th International Conference in Central Europe on Computer Graphics, Visualization and Interactive Digital Media. Plyen, Czech Republic,February 6 - 9, 2001. 375-378.

[5] Suszczanska, N., Szmal, P., and Francik, J., "Translating Polish Texts into Sign language in the TGT System", the 20th IASTED International Multi-Conference on Allpied Informatics, Innsbruck, Austria, pp. 282-287, 2002.

[6] Scarlatos, T., Scarlatos, L., Gallarotti, F., "iSIGN: Making The Benefits of ReadingAloud Accessible to Families with Deaf Children". The 6th IASTED International Conference on Computers, Graphics, and Imaging CGIM 2003, Hawaii, USA, August 13-15,2003.

[7] San-Segundo, R., Montero, J.M., Macias-Guarasa, J., Cordoba, R., Ferreiros, J., and Pardo, J.M., "Generating Gestures from Speech", Proc. of the InternationalConference on Spoken Language Processing (ICSLP'2004). Isla Jeju (corea).October 4-8, 2004.

[8] Aleem khalid ,Ali M, M. Usman, S. Mumtaz, Yousuf" Bolthay Haath – Paskistan sign Language Recgnition" CSIDC 2005

[9] Paulraj M P, Sazali Yaacob, Hazry Desa, Hema C.R, .et al., "Extraction of Head and Hand Gesture Features for Recognition of Sign Language" International Conference on Electronic Design 2008, ICED 2008, pp.1-6, 2008.

[10] Tadashi Matsuo, Yoshiaki Shirai, Nobutaka Shimada, "Automatic Generation of HMM Topology for Sign Language Recognition", 19th International Conference on Pattern Recognition, pp.1-4, ICPR 2008.