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Speech Recognition Technique for Deaf and Dumb People: A Survey

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Abstract

This survey primarily focuses on the development of handheld communication aid for deaf and dumb people to communicate easily and frequentlywith normal people by using language such as English. The work so far gone for the development of voice input voice output communication aid (VIVOCA) those who are affected by severe dysarthria and also introduced some methods involving sign language translating devices such as gesture sensing gloves but the sign language method has got serious drawbacks.The various techniques for translating recognized text signal into voice then image for deaf and dumb people was survived in this paper.

Keywords: Automatic Speech recognition, Dysarthria, Audio decoder, Voice output communication aid

Introduction

Generally,many peoples in this world severely suffering from hearing loss (deaf) and speech loss (dumb) that might have occurred since birth or during their lifetime later. Peoples with sensory disabilities such as deafness, dumbness, or deaf-dumb uses their properly functioning parts like hands, fingers to communicate and have access to the world. In some cases, their impaired senses can be partially repaired to be functional to some degree. The drive for human communication is so strong that unexpected human audio, visual, and tactile communication strategies have evolved throughout time. For example, deaf people have formed communities around the world and in these communities sign languages, which are completely visual, have arisen naturally as an alternative to spoken language. Sign language is a symbolic representation of words by using hands and fingers in different positions. But it has the major limitation as it is hard to understand by a normal people, only persons those who are knowing the sign language can able to communicate. Also, it cannot translate all the words which we spoke but only certain set of messages like English into a sign language symbol. Deafness and Dumbness cannot be cured by medicines because they are not some disease caused by some virus. There are no sages alive who can cure them by their will power and hence those people must depend on science and technology to innovate a solution to make them live a better life. Due to the problem associated with sign language a communication device was founded as a result of several research works. By using augmentative and alternative communication (AAC), Automatic speech recognition (ASR) there are Several effective techniques were discovered for the design of voice-input voice-output communication aid (VIVOCA). These techniques are only for people suffered by unintelligible speech which is called dysarthria but not suitable for speaching loss(deaf) and hearing loss(dumb) peoples.Even though people had proposed many projects involving sign language translating devices such as gesture sensing gloves, these are anything but correct solution because the sign language method has got serious drawbacks mentioned above. So we propose a new form of handheld communication device that aims to eliminate these drawbacks with the help of the latest technologies available.

In this survey, a various speech recognition and voice to image translation technique performs to preserves the speech signals effectively than other older technique. It provides a four-step process to a build a handheld device for deaf and dumb people. First, the gesture to voice translating module.Second,the Speech to Image Translating module.Finally the language learning abilities provided to deaf dumb people.

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Related works

In [1] L. J. Ferrier, H. C. Shane, H. F. Ballard, T. Carpenter, and A. Benoit (1995) proposed the Dragon-Dictate speech recognition system. The objectives were to (1) determine how intelligibility correlates to success of recognition; (2) regulates the characteristics of speech, fluency, and voice whichaffect the voice recognizer accuracy level; and (3) examines individual recognition profiles over a series of dictations among high- and low-intelligibility speakers with severe dysarthria versus nondisabled controls.

In [2] M. S. Hawley et al (2007) Automatic speech recognition (ASR) uses electronic assistive technology for dysarthria speakers. They developed speech recognition sytem for variability of speechutterances and computerised training package to improve the consistency of their vocabulary.

In [3] M. S. Hawley, S. P. Cunningham, F. Cardinaux, A. Coy, S. Seghal, and P. Enderby (2007) describes the development of device based on voice-input voice-output communication (VIVOCA) for people affected with severe dysarthria. The speech recognition technique used in this project is named asspeech-based control interfaces.And also translation recognition technique called Phrase building technique are also used in this paper.Augmentative and alternative communication (AAC) is a methodologywhich is the combination of symbol used in voice input voice output communication aid (VIVOCA). Automatic speech recognition (ASR) is a algorithm which is high complexity used to implement on a mobile device.

In [4] V. López-Ludeña, R. San-Segundo, R. Martín, D. Sánchez and A. García (2011)proposed a system consists of two modules. The primary module developed a speech recognizer which converts Spanish into SignLanguage (LSE), a natural language translator (for converting a sequence of words into a sequence of signs), and a 3D avatar animation module (for playing back the signs). The secondary module is to develop a generator which performs a conversion of Spoken Spanish language to sign-writing which is composed of a visual interface (for specifying a sequence of signs), a language translator (for generating the sequence of words in Spanish), and finally, a gesture to voice converter. For language translation, an example-based strategy, a rule-based translation method and a statistical translator techniques are used.

In [5] J. Murphy [2004] examines the communication between people affected by MotorNeurone Disease (MND) and their communication partners nearer, as the disease progressed. The usage and the purpose of the augmentative and alternative communication (AAC) according to the perceptions of people with MND and their communication partners were examined.

In [6] M. Parker, S. P. Cunningham, P. Enderby, M. S. Hawley, and P. D. Green (2006)describes the development of robust computer speech recognizer by using the technique called stardust.Speech recognition for speaker is achieved by speaker dependent computerizedprocess based on identification of robust phonetic elements within the output patterns of each individual speakers using hidden markov models.

In [7] L. R. Rabiner and B. H. Juang (1986) discussed about the theory of Markov models, and to illustrate how they have been applied to problems in speech recognition. HMM's provide a framework based upon which higher level structures in continuous speech signals may be integrally modeled.

U. Sandler and Y. Sonnenblick [8] proposed a device which is compact and standalone system for onlineaudio-translation of discrete with severe speech impairment. The system consists of two modules: one module is for recording and preprocessing the person with inaccurate speech, based on a PC computer; and a standalone, compact device for on-line recognition and interpretation based on a modified neural network.

H. V. Sharma and M. Hasegawa-Johnson [9] describes the results of their experimentsin building speaker-adaptive recognizersfor talkers with spastic dysarthria. They proposed two modifications – (a) MAP adaptationof speaker-independent systems trainedon normal speech and, (b) using a transitionprobability matrix that is a linear interpolationbetween fully ergodic and (exclusively) left-to-right structures, for both speaker-dependentand speaker-adapted systems.

J.Todman, N. Alm, J. Higginbotham, and P. File, [10] describes that utterance-based approaches proposed to deliver rates quickly without logical loss. The principle approach of this work is to develop a utterance-based devices (UBDs). Next, the causal relationship between conversational rate and positive attributions has monitored. Conversational rate and

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superficial communicative proficiency were both higher when the UBD was used.

N. Thomas-Stonell,A.L.Kotler, H.A. Leeper, and P. C. Doyle, [11] examined the effects of intelligibility and consistency on the recognition accuracy of a speaker-adaptable speech recognition system. Results also suggest that perceived inconsistencies in the speech productions of dysarthria speakers may not limit their use of a speaker-adaptable speech recognition system.

B. Wisenburn and D. J. Higginbotham, [12] focused on the use of automatic speech recognition and parsing of the speaking partner's productions to identify spoken noun phrases. The program user could then produce scripted messages using these noun phrases, or could produce these noun phrases combined with typed text. Two conditions were applied : A new communication device applied an alpha-only condition and an identical device applied an alpha-converser condition. An objective measurements were compares the program user's rate and Converser usage rate.

B. Wisenburn and D. J. Higginbotham, [13] explores the efficacy of an AAC application, Converser, that uses natural language processing to assist in communication. Program users rated the speed of communication faster in the alpha-Converser condition. Program user ratings of quality, and speaking partner ratings of speed and quality.

S. Young et al [14] discussed about the two HTK processand Hidden Markov Models (HMMs). HTK is a tool for creating Hidden Markov Models (HMMs). HTK is usually designed because of creating HMM-based speech processing tools, in particular recognisers. There are two major processing stages involved. Firstly, the HTK based tools are used to calculate the set of parameters based on HMMs using training utterance and their associated transcriptions. Secondly, unknown expressionstranscribed using the HTK recognition tools.

Results and discussion

There are various speech recognition techniques and translation techniques existing for people affected by dysathria to communicate with converser in this survey were studied. So, in this survey, the Automatic Speech Recognition (ASR) effectively recognize voice with greater tolerance to variability of speech. Automatic speech recognition (ASR) is a high complexity algorithm used to implement on a mobile device. MP3 audio decoder is used to decode the text information into audio (Voice data).

Conclusion

In this survey, it has been concluded that there are several techniques discovered for the development of speech recognition between deaf & dumb people and normal people, based on automatic speech recognition technique by designing a handheld voice output communication aid. The device which is configured by set of passages or words that enable the user to form either simple or complex messages. Most of the papers mainly focused on VIVOCA for dysarthria people. Since I concluded, that a Voice Input Voice Output handheld communication aid using a new speech recognition technique is proposed in my future work.

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