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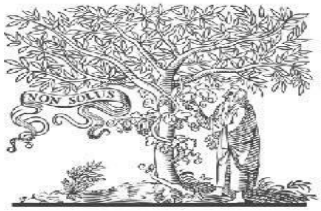

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ENABLING ALTERNATIVE ACCESSIBLE STRATEGIES FOR PERSONS WITH SPEECH IMPAIRMENT

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ABSTRACT
As we know that language takes a major portion for communication between two people or many people. But What about deaf people and deaf and dumb people? Over an estimation18 billion people are deaf and There is only one language to them is SIGN LANGUAGE to communicate to others. The main source of communication for speech impaired people is sign language (A language used to communication with others using hands & face expressions). But this sign language is not understandable by normal people. As our project aim to develop the application for make easy to speech impaired people to communicate to others. So, we added two strategies sign language to text/voice and text to speech and in most of the cases speech impaired people are deaf. So, we also want to add two other strategies called text/voice to sign language and speech to text. So, these alternative strategies help the speech impaired people to communicate with other by using our application and this platform will also help the normal persons to communicate with the speech impaired persons.

KEYWORDS: Sign Language, Machine Learning, Text, Speech, Random Forest Classifier.

INTRODUCTION

People with speech impairments, including those who are deaf or hard of hearing, face significant challenges in their daily communication. Augmentative and Alternative Communication (AAC) strategies can provide a solution for these individuals to communicate effectively. AAC includes various methods, such as sign language, gesture recognition, and text-based systems, to support communication for those with speech impairments. With advancements in technology, machine learning and artificial intelligence techniques have been utilized to improve the accuracy and efficiency of AAC systems. This research aims to explore the state of the art in AAC, with a focus on enabling accessible strategies for people with speech impairments through the use of machine learning and AI.

Speech impairments can have various causes, such as developmental disorders, traumatic brain injuries, degenerative diseases, and physical impairments. These impairments can affect a person's ability to produce speech sounds or comprehend spoken language. AAC systems can help individuals overcome these challenges by providing a different mode of communication.

The development of technology-based AAC systems has provided new opportunities to improve the lives of people with speech impairments. These systems can be personalized to meet the needs of individual users, and they can be used in a variety of settings, such as at home, in school, and in the workplace. They can also be used to support communication between individuals with speech

impairments and those who do not have these impairments.

Despite these advancements, there are still many challenges to be addressed in the development of AAC systems. These include issues related to accessibility, affordability, and user-friendliness. Researchers are actively working to overcome these challenges and develop more effective and user-friendly AAC systems.

Sign Language:
Sign language recognition is a field of study that aims to develop computer systems capable of translating sign language gestures into text or speech. Sign language is a visual form of communication that is used primarily by individuals who are deaf or hard-of-hearing, and there are many different sign languages used around the world, such as American Sign Language (ASL) and British Sign Language (BSL). This technology provides an opportunity for individuals with speech impairments to communicate more effectively with those who do not understand sign language, without the need for an interpreter. Despite its potential benefits, sign language recognition is a challenging problem due to the complex nature of sign languages, which involve hand gestures, facial expressions, and body posture. However, recent advancements in deep learning and computer vision have led to significant progress in sign language recognition, and there is ongoing research aimed at improving its accuracy and usability. The development of effective sign language recognition systems could greatly improve the accessibility and independence of individuals with speech impairments.

LITERATURE REVIEW
The Keerthi S Warrier et al.[1] focuses on the development of a software-based system for converting sign language gestures into text or speech. The authors aim to provide an alternative communication method for people with speech impairments and help bridge the communication gap between the deaf and non-deaf communities. The system uses computer vision techniques to recognize and interpret sign language gestures, and a speech synthesis module to convert the recognized gestures into speech or text. The authors evaluate the performance of the system using a dataset of sign language gestures and demonstrate its effectiveness in accurately converting sign language into speech or text. The results of this study highlight the potential of software-based sign language converters to improve communication accessibility for people with speech impairments.

The Rachit Magon [2] proposed a software-based system that can recognize sign language gestures and convert them into speech. The system uses image processing techniques and machine learning algorithms to extract the hand gestures and map them to pre-defined speech patterns. The system was evaluated on a set of predefined sign language gestures, and the results showed that the system was able to recognize the gestures with an accuracy of over 90%. The authors also discussed the potential applications of the system, including assisting deaf and hard-of-hearing individuals in communication with hearing individuals and enhancing accessibility for those with speech impairments. Overall, the paper provides a valuable contribution to the field of sign language recognition and conversion, offering a cost-effective solution that can be accessible to a wider range of users.
The P.K.Bora [3] present a method for gesture recognition based on the trajectory of the hand in 3D space, which is generated by tracking the hand movements using a camera. The hand gestures are represented as sequences of 3D points, and the recognition is performed by comparing the test gesture with a set of predefined gestures in the database. The authors use a dynamic time warping (DTW) algorithm to match the test gesture with the closest gesture in the database. This study contributes to

the field of hand gesture recognition and highlights the importance of considering global motion for effective recognition. It also has implications for the development of assistive technologies for people with speech impairments, as hand gestures can be used as a means of communication.

The Lalit Goyal [4] explains the need for a text-to-sign language translation system as a means of bridging the communication gap between hearing individuals and those with speech impairments. They then present their proposed system, which consists of three main components: text processing, gesture generation, and gesture animation. The text processing component is responsible for converting the input text into an intermediate format that can be processed by the gesture generation component. The gesture generation component uses this intermediate format to generate the sign language gestures, which are then animated by the gesture animation component. They describe the challenges involved in designing such a system, such as gesture variability, the difficulty of accurately representing sign language gestures in a digital format, and the need to design a system that can handle different sign languages. They conclude that their system is capable of accurately translating text into sign language gestures and that it has the potential to improve communication between hearing individuals and those with speech impairments.
The Mahesh Kumar [5] addresses the need for accessible communication between the deaf and hearing communities, and how technology can play a crucial role in bridging this gap. The author explains the challenges faced in sign language recognition and translation, such as the variability and complexity of sign language gestures and the difficulty in accurately capturing and interpreting them. The paper also highlights various approaches and techniques used for sign language recognition and translation, including image processing, computer vision, and machine learning algorithms. The author specifically mentions the use of Deep Neural Networks (DNNs) in recent sign language recognition and translation systems, and their potential for improved accuracy and robustness. Finally, the author concludes by emphasizing the importance of continued research and development in the field of sign language recognition and translation, and the potential impact it could have in enabling more inclusive and accessible communication for the deaf community.

EXSISTING SYSTEM

They are many solutions in the existing world and some solutions will work in low accuracy and some solutions are working in better manner. But there is no one single platform for providing many strategies for a speech impaired person and in every situation a different platform should be used by them. For example, for a sign language translator needs a neat atmosphere for extracting the correct signs of the person and in this situation, it is difficult to use and in this situation text to speech will helpful.

So in every situation a different solution is created. But there is no single platform for all those solutions to help them to communicate with the normal people.

PROPOSED SYSTEM

As we mentioned lot of problems that is facing by the speech impaired people in the existing phase. So, we want to proposed a solution for this problems and this solution can help the speech impaired people in the every situation.

Our solution is to create a single platform or application to all the problems faced by the speech impaired people for communication with others and normal to speech impaired people.

In our platform we want to add different strategies in our application to help those people for communication and these

strategies are sign language to text/voice, text/voice to sign language, text to speech and speech to text. As these strategies can help the speech impaired people by using our application by simply using a single device like mobile, laptop etc.

METHDOLOGY

Our platform is divided into four categories:

1. Sign language to Text/Voice
2. Text to Sign Language
3. Text to Speech
4. Speech to text

Sign Language to Text/Voice:

In this category we want to convert the respective sign language to text or voice. As for getting the data from the user we want use a camera to capture the data. Our collecting the data we have convert the video format data to respective text or voice using MACHINE LEARNING Technology.

Text to Sign language:

In this category we want to convert the respective text to sign language. For Converting the text to a video format, we will train the program by giving the data to it. This help to convert the text to sign language.

Text to Speech:

In this category we want to convert respective text to speech using the python inbuilt module. This module will help for converting the text to the speech.

Speech to Text:

In this category we want to covert the respective speech to text using python modules. These modules will help to convert the given speech input to the text.

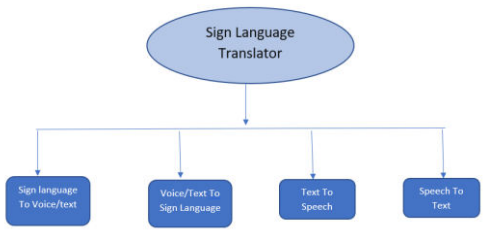

Fig: Architecture

Data Collection:

The data collection process is crucial for the development of the platform for speech impaired people. A large dataset of sign language gestures and corresponding text and speech data is required to train machine learning models effectively. The data can be collected through various sources such as online databases, libraries, and from speech impaired individuals themselves. The data should be diverse and representative of different sign languages, age groups, and cultures to ensure the platform can cater to a wide range of users.

Pre-processing:

Pre-processing the collected data is important to ensure the accuracy and consistency of the data used for training the machine learning models. The pre-processing steps may include cleaning the data, removing any duplicates, converting the data into a consistent format, and normalizing the data. Pre-processing the data can also involve splitting the data into training and testing sets to evaluate the performance of the models.

Model Development:

The machine learning models should be trained using the pre-processed data to develop sign language to text, text to sign language, text to speech, and speech to text functionalities. The models can be developed using various machine learning algorithms such as deep learning, Convolutional Neural Networks (CNNs), and Recurrent Neural Networks (RNNs). The models should be optimized using appropriate hyperparameter tuning techniques to improve their overall performance.

Model Evaluation:

The performance of the developed models should be evaluated using various performance metrics such as accuracy, precision, recall, and F1-score. The evaluation should be conducted on the testing data set that was created during the pre-processing step. The evaluation

process can also involve comparing the performance of the models with existing solutions in the market.

Customizable dictionaries:
This feature allows users to create their own dictionaries of sign language gestures corresponding to specific words or phrases for faster and more efficient communication. Users can add, edit, and delete entries in the dictionary as needed. The dictionaries can be saved for future use, making it easier for users to communicate with others who are familiar with the same set of signs.

Real-time translation:
This feature enables the platform to translate text into sign language gestures in real-time, allowing for fast and seamless communication between speech impaired individuals and those who are not familiar with sign language. The translation process can be initiated with a simple button press or by using voice commands.

Speech recognition:
The platform can use advanced speech recognition techniques to accurately transcribe speech into text, even in noisy environments.

Text to speech synthesis:
The platform can use text to speech synthesis techniques to convert text into speech, with options for changing the voice, speed, and pitch.

RESULT
CONCLUSION
The platform for speech impaired individuals has the potential to significantly improve the lives of individuals with speech impairments by providing them with new and innovative ways to communicate. The platform's combination of machine learning, text-to-speech, speech-to-text, and sign language-to-text capabilities make it a unique and valuable tool for speech impaired individuals. The successful development and implementation of this platform will require careful consideration of user requirements, technical feasibility, and business viability. Through a collaborative and user-centred design process, the platform can be developed to meet the needs of speech impaired individuals and provide them with greater opportunities for communication and engagement

FUTURE SCOPE
Future scope of the speech impaired platform includes integration with smart home devices, expanded language support, improved accuracy, mobile app development, and social networking features for building community. Potential for further development is vast through ongoing research and innovation.

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