

A SYNOPSIS ON

“REAL-TIME HAND GESTURES TO AUDIO TRANSFORMATION FOR SPEECH IMPAIRED”

Submitted in partial fulfilment of the Requirement

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COMPUTER SCIENCE AND ENGINEERING

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REAL-TIME HAND GESTURES TO AUDIO TRANSFORMATION FOR SPEECH IMPAIRED

PROJECT AREA

Image processing

PROJECT TYPE

Software

ABSTRACT

Real-time Hand Gestures to Audio Transformation for Speech Impaired seeks to bridge the communication gap between mute individuals and the wider community, particularly those unfamiliar with Sign Language. This innovative application captures hand gestures in American Sign Language (ASL) and swiftly translates them into corresponding text and speech in real time. By converting these gestures into text and audio output, the project aims to create an effective tool for facilitating communication between mute individuals and the general public, making it easier for them to express themselves and be understood.

INTRODUCTION

In the intricate tapestry of human interaction, communication serves as the thread that binds us all. It's the conduit through which ideas are exchanged, relationships are forged, and progress is achieved. However, amidst the digital revolution that has transformed the way we connect, there exists a profound disparity. For the speech-impaired individuals, communication is a challenge navigated daily. Existing communication aids, while a testament to human ingenuity, do not provide the real-time, intuitive platforms necessary for these individuals to articulate their thoughts and emotions effectively. This disparity denies them the fundamental right to express themselves freely, limiting their social integration and professional aspirations. The absence of inclusive, gesture-based communication tools exacerbates their sense of isolation, hindering their participation in the dynamic landscapes of education, employment, and social engagement. Our collective responsibility is to

bridge this divide. In this endeavor, we embark on a transformative journey, guided by innovation and empathy, to develop revolutionary communication technologies. These solutions will not merely offer a means to communicate; they will offer a voice, a bridge to a world where everyone is heard, understood, and embraced. Through pioneering technology and unwavering dedication, we aspire to usher in an era where the speech-impaired are not just integrated into society but are active, valued contributors. Together, let us redefine the boundaries of communication, ensuring that every individual, regardless of their abilities, can participate fully in the rich tapestry of human connection.

METHODOLOGY

Data Collection using OpenCV :

- OpenCV offers diverse functions for image and video processing, enabling tasks like resizing, grayscale conversion, and applying filters.
- Processed data can be saved in multiple formats using OpenCV functions or standard file I/O operations in the programming language.

CNN Algorithm :

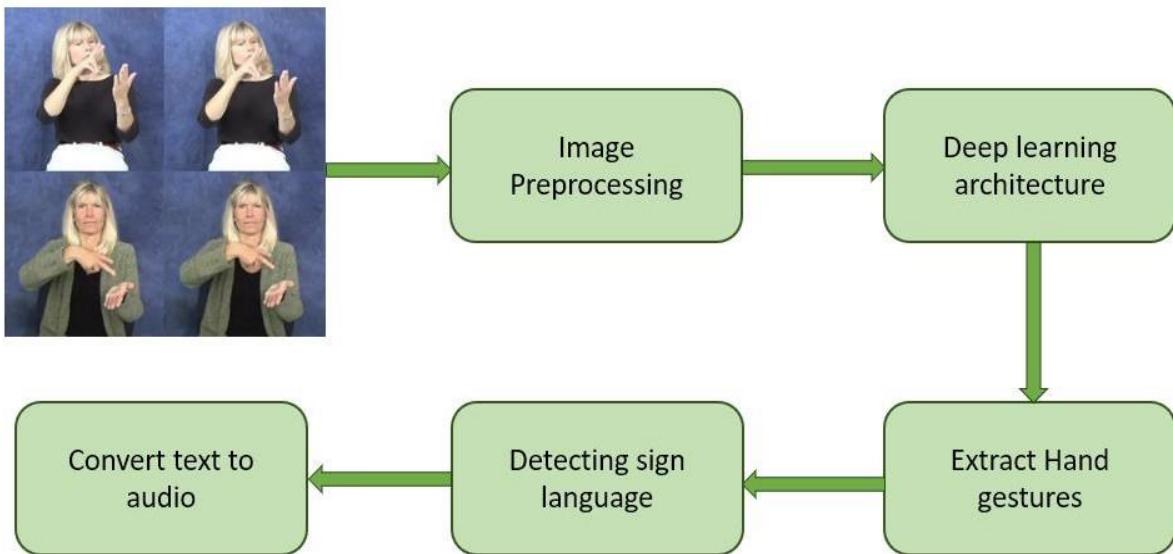
- Design a neural network architecture for gesture recognition.
- Convolutional Neural Networks (CNNs) are commonly used for image-based tasks.
- CNN architecture is used to extract features from sign language images.

Train the Model :

- The main step after CNN architecture is to train the model.
- Train the CNN part of the model on the sign language dataset for gesture recognition.
- It is trained with the help of Keras and Tensorflow.
- Gestures performed by the user are captured by the live camera feed and input into the gesture recognition system.
- It then identifies and displays the meaning of the gesture.

Text and Speech Synthesis of Classified Images :

- Generating spoken language output from recognized sign language gestures involves using a Text-to-Speech (TTS) system.
- Pass the recognized and converted text to the chosen TTS system.
- The system will process the text and generate a waveform representing the spoken language.



The diagram illustrates a systematic process for converting sign language into audio output. It begins with sign language gestures, which are initially processed through image recognition and analysis. Deep learning architecture is then employed to extract and interpret hand gestures, effectively detecting the sign language being expressed. The detected sign language is subsequently converted into text and further transformed into audio, ultimately providing a means for speech-impaired individuals to communicate effectively with others using their sign language, enhancing their accessibility and enabling broader understanding.

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