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SIGN LANGUAGE RECOGNITION SYSTEM

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ABSTRACT:

Sign language is the preferred method of communication for the deaf and hard of hearing community. It is a visual language that uses hand gestures, facial expressions, and body language to convey meaning. Sign language recognition (SLR) is a field of computer science that deals with the development of systems that can automatically recognize and translate sign language into spoken language or text. Sign language recognition systems have the potential to revolutionize the way deaf and hard of hearing people interact with the world around them. They could be used to provide real-time translation services in a variety of settings, such as education, employment, and healthcare. SLR systems could also be used to develop new educational tools and to improve the accessibility of existing technology. Harnessing cutting-edge computer vision and machine learning technologies, this system demonstrates the potential to recognize and interpret a wide array of sign language gestures with remarkable accuracy and efficiency. By employing deep neural networks and sophisticated algorithms, the SLRS aims to convert these gestures into both written text and spoken language, facilitating seamless interaction between deaf individuals and the hearing world.

Index Terms **- Sign Language, Computer Vision, deaf, deep neural network**

I. INTRODUCTION

Sign language is a visual language that uses hand gestures,facial expressions, and body language to convey meaning. It is the preferred method of communication for the deaf and of hearing community.However, sign language is not widely known or understood by the general population. This can create communication barriers for deaf and hard of hearing people in a variety of settings, such as education, employment, and healthcare.Sign language recognition (SLR) is a field of computer science that deals with the development of systems that can automatically recognize and translate sign language into spoken language or

text. SLR systems have the potential to revolutionize the way deaf and hard of hearing people interact with the world around them.

This project aims to develop a sign language recognition system that is accurate, efficient, and affordable. The system will be based on deep learning, a machine learning technique that has been shown to be very effective for image recognition tasks. The system will be trained on a large dateset of sign language videos and corresponding text transcriptions .Once the system is trained, it will be able to recognize signs in real time and translate them into text. The system will be integrated into a mobile app that can be used by deaf and hard of hearing people to communicates with others.

The project has the potential to make a significant impact on the lives of deaf and hard of hearing people. By providing a reliable and affordable way to translate sign language, the system can help deaf and hard of hearing people to participate more fully in society. The project is also expected to benefit the general population by making sign language more accessible and understandable. The development of a sign language recognition system is a challenging task, but it has the potential to make a real difference in the lives of deaf and hard of hearing people. This project is committed to developing a system that is accurate, efficient, and affordable, so that it can be used by as many people as possible.

II. AIMS AND OBJECTIVES

The aim of a sign language recognition system is to bridge communication barriers between individuals who are deaf or hard of hearing and those who are not proficient in sign language. The aim of a sign language recognition system is to bridge communication barriers between individuals who are deaf or hard of hearing and those who are not proficient in sign language. The System will be able to achieve the following objectives:

1.To develop an accurate real-time sign language interpreter.

2.To interaction through sign language recognition.

3.To design a user-friendly system for individuals with limited signing skills.

4.To optimize for both static and dynamic sign languages.

5.To research and implement advanced algorithms for better performance.

III. EXISTING SYSTEM:-

A Sign language Recognition System employ various technologies, including computer vision,machine learning,and wearable devices, to facilitate communication between deaf or hard of hearing individuals and the hearing communication. These system often reply on data gloves,sensors,or cameras to capture signers hand and finger movements,converting them into recognizable signs. Machine learning algorithm,such as neural networks and hidden Markov models,are then employed to interpret these gestures,and the system typically require extensive training on sign language databases. Mobile application and feedback system are making these recognition tools more accessible, enabling users to communication through

their smartphones or receiving real time feedback. Sign language recognition is an ever evolving field, with ongoing research aimed at enhancing accuracy and expanding the scope of recognized sign,ensuring more inclusive and effective communication for deaf community.

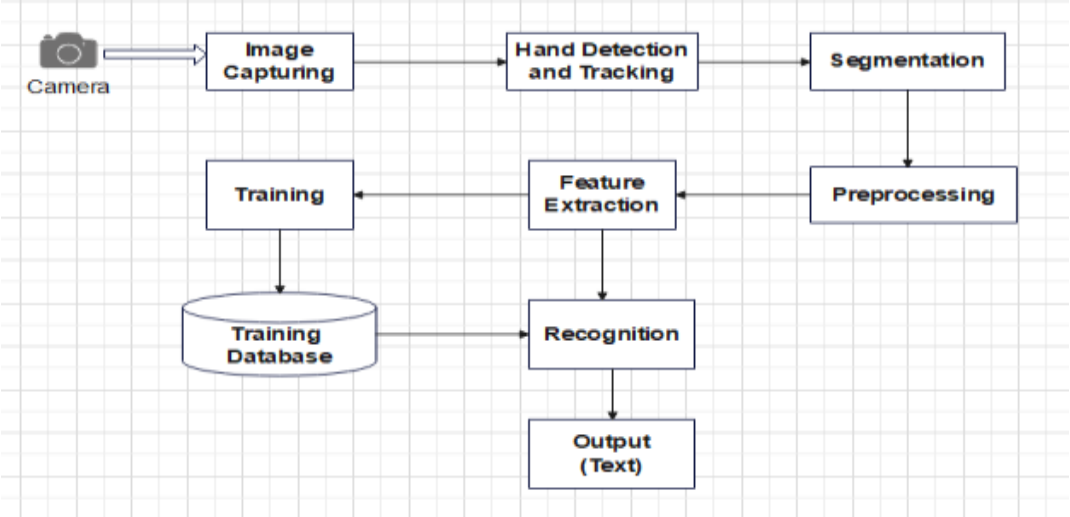


Fig.System Architecture

Hand Detection: Identify and track the signer's hands. This can be done using techniques like color-based tracking, skin detection, or deep learning-based hand detection models.

Segmentation: The method of separating objects or signs from the context of a captured image is known as segmentation. The segmentation process involves utilizing techniques such as text subtraction, skin-color detection, and edge detection to delineate objects or regions of interest within an image or video.

Feature Extraction: Extract relevant features from the sign language data. Features might include hand positions, hand movements, and facial expressions.

Preprocessing: Normalize video data by removing noise, standardizing lighting, and background, and converting frames to a consistent format.

Training: Train the model on the training dateset, using appropriate loss functions (e.g., categorical cross-entropy) and optimization algorithms.

IV. PROPOSED SYSTEM:

A proposed sign language recognition system should aim to bridge the communication gap between the deaf and hard-of-hearing community and the hearing world. This proposed sign language recognition system, equipped with advanced technology, machine learning models, and user-friendly features, has the potential to significantly improve communication and accessibility for the deaf and hard-of-hearing

community. Collaborating closely with experts in sign linguistics, machine learning, and human-computer interaction, along with ongoing testing and user feedback, will be key to its success and usability.

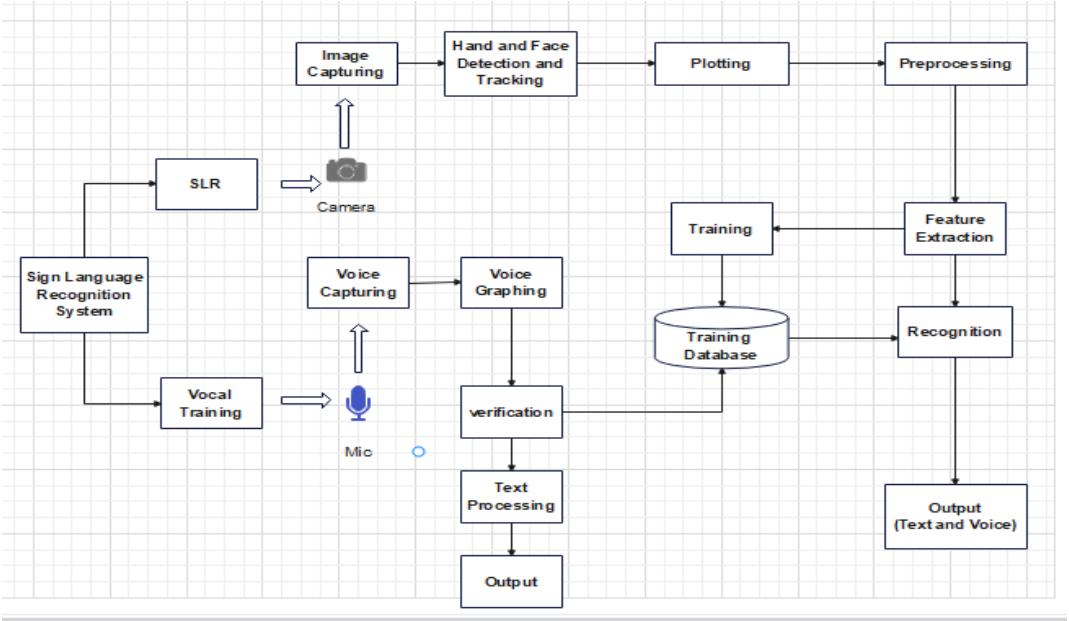


Fig. Architectural Diagram

v. METHODOLOGY: -

Algorithms:

CNN

1.Collect a dataset of sign language image.

2.Preprocess the image.

3.Create a SQLite3 database to store the pre-processed videos and their corresponding labels.

4.Train a CNN model to recognize the sign language words and phrases in the database.

To train the model, you can use the following steps:

1.Load the pre-processed videos and their corresponding labels from the SQLite3 database.

2.Split the data into training and testing sets.

3.Train the CNN model on the training set.

4.Evaluate the model on the testing set.

5.Once the model is trained, save it to a file.

SVM

1.Collect a dataset of sign language image.

2.Extract features from the image.

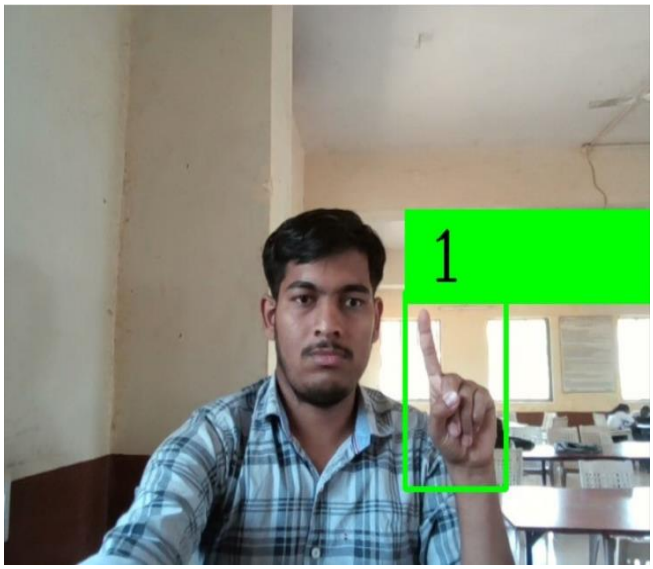
3.Store the features in a SQLite3 database.

4.Split the dataset into training and testing sets.

5.Train the SVM algorithm.

6.Evaluate the performance of the SVM algorithm.

VI. DESIGN DETAILS :-



VII. CONCLUSION:

The Sign Language Recognition System is a significant advancement in technology, enhancing inclusivity and communication, despite challenges like gestural complexity and standardization. Nonetheless, ongoing research and development are essential to enhance the accuracy, reliability, and user-friendliness of these systems for seamless integration into daily activities.. More training data can be added to find the letter with more accuracy. This project can be expanded to convert symbols into speech. The system can be developed into an android application so that It makes communication more easy on the go.

VIII. ACKNOWLEDGMENT:

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