

Sign Language Recognition

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Abstract — Sign language recognition is a process that involves interpreting and understanding sign language gestures using computer vision and machine learning algorithms. This technology can help bridge the communication gap between deaf and hearing communities since sign language is generally used by people who are deaf. To recognize sign language, computer vision is often used to track the movements of the hands and body, while machine learning algorithms are used to recognize different sign language gestures. Some sign language recognition systems also incorporate sensors or gloves that can detect the movements of the hands and fingers. The potential applications of sign language recognition technology are numerous, including creating more accessible learning materials for students who use sign language and facilitating communication between deaf and hearing individuals. However, challenges still need to be addressed to develop accurate and reliable sign language recognition systems.

Keywords: Sign Language Recognition, Machine Learning

I. INTRODUCTION

Sign language recognition is an emerging technology that aims to facilitate communication between deaf and hearing communities. However, the communication barrier between deaf and hearing individuals can limit their ability to interact and share ideas.

Sign language recognition technology uses computer vision and machine learning algorithms. It could also have applications in various fields, such as education, where it could create more accessible learning materials for sign language students.

While sign language recognition technology has shown promising results, technical challenges still need to be addressed to develop more accurate and reliable systems. Nonetheless, the advancement of this technology will help improve communication and foster inclusivity for deaf and hard-of-hearing individuals.

While sign language is a rich and expressive language, it can be difficult for those who do not know it to communicate effectively with signers. So, we use sign language technology. Sign language recognition uses newly developed technologies, bridging the communication gap between deaf and hearing individuals.

II. LITERATURE SURVEY

A recent survey in American Sign Language shows that we can communicate using sign language using neural networks. It converts sign language to text/voice without using any gloves or sensors. It captures the gestures made by an individual and then converts them into voice.

Another research paper survey on sign language recognition in MATLAB Environment was developed. It had

a training and testing phase. In the training phase, neural networks were used and then it was later tested. The drawback of this method is that MATLAB was not as efficient in giving proper results.

Some other approaches also included dynamic and static hand gestures, Skin Detection, Robotics, Augmented Reality Games, etc. Some limitations occurred due to background lighting or the noise present in the background. But in deep learning models, the results were identical for noisy and clear backgrounds. Sometimes users have to be in a particular background to get a proper result.

CNN and LSTM approaches were used in which CNN was used to learn gestures and facial features and its output was given to LSTM to acquire features.

III. PROPOSED WORK

Sign language recognition using machine learning is a fascinating and challenging research area. It involves software that can identify gestures, without being affected by variations in lighting conditions, hand size, or different signing styles.

To build software using machine learning, you need to follow these steps:

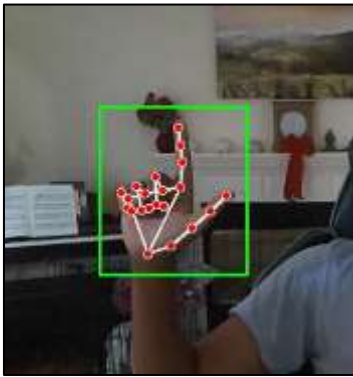
- 1) Collect a dataset of sign language gestures: You will need a large and diverse dataset of sign language gestures performed by different signers. You can collect this dataset by recording videos of signers performing the gestures or by using an existing dataset.



- 2) Preprocess the dataset: Once you have collected the dataset, you will need to preprocess it to extract the relevant features from the videos. This can include hand tracking, motion detection, and feature extraction.
- 3) Training a model: After preprocessing the dataset, you will need to train a model on the dataset. We can use models like CNN, RNN, or deep learning architectures such as the transformer.
- 4) Evaluate the model: Once the model is trained, you will need to evaluate its performance on a test set of sign language gestures. This will show you how well the model can generalize to new sign language gestures.

5) Deploy the model: After evaluating the model, you can deploy it on a recognition system. It involves integrating the model with a video camera or a motion sensor to recognize sign language gestures in real-time.

It is essential to note that creating an un plagiarized sign language recognition system using machine learning requires a significant amount of expertise in both sign language and machine learning. Additionally, you should ensure that you have the necessary legal rights to use any existing datasets or models, as plagiarism can have severe consequences.



IV. RESULTS AND DISCUSSION

The result shows that we can successfully detect any phrase or alphabet using machine learning in our model.

Through training and testing, we can achieve high accuracy in our results. Real-time object detection can also be used to achieve this level of accuracy. We can use open CV and deep learning to reach our goal in that method.

V. FUTURE SCOPE

This model has been successfully created and works well. In the future, we will try to make it more accurate according to our research and work. This model can be a powerful helping hand to many people, so we will make this model give the output in speech format. The goal will be to improve this model so that it is more easily accessible to people and can communicate with a speech in real time. This model will be able to detect the sign as it does now and convert it into a speech format like a person speaking in real-time.

VI. CONCLUSION

With the recent advancements in computational intelligence and machine learning. Sign language recognition attracts a lot of researchers and industrial practitioners.

With the invention of new technologies, there is a huge scope of advancements in the practices that we use right now.

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