Sign Language Recognition Using Python

Article · April 2023

CITATIONS
0

READS
30

5 authors, including:

Sheetal Patil
Bharati Vidyapeeth Deemed University
12 PUBLICATIONS **4** CITATIONS

SEE PROFILE

IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Sign Language Recognition Using Python

Tejaswini Shinde[1] , Muskan Tamboli[2] , Rachana Patil[3] , Aditi Pangare[4]

Lecturer Mrs. Sheetal Patil[5]

[1,2,3,4] Students; Dept. of Computer Technology, Bharati Vidyapeeth's J.N.I.O.T, Pune, Maharashtra, India.

[5] Lecturer; Dept. of Computer Technology, B.V.J.N.I.O.T, Pune, Maharashtra, India.

Abstract

Sign Language is substantially used by deaf and dumb people to change information between their own community and with other people. It's a language where people use their hand gestures to communicate as they can not speak or hear. Sign Language Recognition(SLR) deals with feting the hand gestures achievement and continues till text is generated for corresponding hand gestures. Then hand gestures for sign language can be classified as static and dynamic. still, static hand gesture recognition is simpler than dynamic hand gesture recognition, but both recognition is important to the community. We can use Deep Learning Computer Vision to fete the hand gestures by erecting Deep Neural Network infrastructures(complication Neural Network infrastructures) where the model will learn to fete the hand gestures images over an time. Once the model Successfully recognizes the gesture the corresponding English text is generated and also display on the screen. This model will be more effective and hence communicate for the deaf and dump people will be easier.

KEYWORDS: Sign Language Recognition1, Complication Neural Network2, Image Processing3, Edge Detection4, Hand Gesture Recogniton5.

Introduction

Sign language is used by people who have speech and hearing impairments to communicate. Disabled People employ non-verbal communication techniques like these sign language movements to convey their feelings and ideas to other regular people. However, since these regular people have trouble understanding their communication, skilled sign language professionals are required during medical and legal appointments as well as educational and training sessions. The demand for these services has grown during the last several years. Other types of services have been established, such as video remote human interpretation utilizing a high-speed Internet connection. These services provide a simple sign language interpretation service that may be utilized and is beneficial, but has significant drawbacks. Every person has to be able to communicate effectively in order to share thoughts and ideas. The sole means of exchanging information by spoken, written, visual, or behavioral means is through communication. Ordinary individuals can convey their thoughts to others via speech, but communication becomes a significant challenge for those who are deaf or have hearing loss. Sign language is used as a form of communication for the deaf and hard of hearing. Between 500,000 and 2,000,000 hearing-impaired persons use sign language to communicate on a daily basis. For the deaf and the hearing impaired, several sign languages have been developed. Each nation has its own sign language.

Objectives

- Communication is always having a great impact in every domain and it is considered the meaning of thoughts and expression that attracts the researchers to bridge this gap for every living being.

- The objective of this project is to identify the symbolic expression through images so that communication gap between a normal and hearing impaired person can be easily bridged.
- To efficiently and accurately recognize signed words, from Indian Sign Language
- To develop an automatic sign language recognition system with the help of image processing and computer vision techniques.

Literature Survey

1. **Semantic Boundary Detection with Reinforcement Learning for Continuous Sign Language Recognition**

   Author : Chengcheng wei,jian Zhou.

   Published in IEEE : August 2020

There conducted an in-depth examination of the most common DNN-based SLR model architectures. They offered a comparative assessment of the most representative SLR designs based on extensive experimentation in three publicly accessible datasets. Along with this assessment, a new publicly accessible large-scale RGB+D dataset for the Greek SL was released, which is acceptable for SLR benchmarking. EnCTC and StimCTC, two CTC versions used in other domains, were assessed for CSLR. They discovered that their combination addressed two significant issues: confusing borders between neighbouring glosses and intra-gloss dependencies. A comparative experimental evaluation of computer vision-based sign language recognition systems is carried out. A detailed assessment of numerous publically accessible datasets is conducted by applying the most current deep neural network approaches in this area. This research aims to learn more about sign language recognition by mapping non-segmented video streams to glosses. Two novel sequence training criteria are presented for this job, which is familiar with voice and scene text recognition**.**

2. **Hierarchical Recurrent Deep Fusion using Adaptive Clip Summarization for Sign Language Translation**

   Author : Dan Guo, Wengang Zhou

   Published in IEEE : 2019

There conducted an in-depth examination of the most common DNN-based SLR model architectures. They offered a comparative assessment of the most representative SLR designs based on extensive experimentation in three publicly accessible datasets. Along with this assessment, a new publicly accessible large-scale RGB+D dataset for the Greek SL was released, which is acceptable for SLR benchmarking. EnCTC and StimCTC, two CTC versions used in other domains, were assessed for CSLR. They discovered that their combination addressed two significant issues: confusing borders between neighbouring glosses and intra-gloss dependencies. A comparative experimental evaluation of computer vision-based sign language recognition systems is carried out. A detailed assessment of numerous publically accessible datasets is conducted by applying the most current deep neural network approaches in this area. This research aims to learn more about sign language recognition by mapping non-segmented video streams to glosses. Two novel sequence training criteria are presented for this job, which is familiar with voice and scene text recognition.

3. **Weakly Supervised Learning with Multi-Stream CNN-LSTM-HMMs to Discover Sequential Parallelism in Sign Language Videos**

   Author : Richard Bowden

   Published in IEEE : 2018

Models of CNN performance. The first and second structure formats, according to the findings, are static CNN architecture, with the same number of filters and filter sizes for all layers, resulting in a minimum accuracy value. The third format employs an architectural style to calculate the number of filters by ascending with the same filter size, resulting in improved accuracy. In the fourth format, the number of filters is increased in ascending order. The first layer learns the global feature with extensive filters, whereas the second layer learns the local feature with smaller filters.

4. **Advances in machine translation for sign language: approaches, limitations,**
   and challenges

   Author : Adnan Abid, Nabeel sabir khan

   Published in Article in Neural Computing and Applications : May 2021

They preliminary Transfer Learning experiment from a large BSL dataset to a medium-sized ASL dataset. The multimodality model was the best model for classifying ASL when they transferred weights from

the BSL model. For the first time, all of the network topologies in this study trained, compared, and eventually fused to achieve multimodality were benchmarked and examined. Accurate categorization of Sign Language, particularly unobserved data, allows the process to be completed autonomously. A computerized way of non-spoken language interpretation in situations when interpretation is necessary yet unavailable. Compared to the solitary techniques of image classification and Leap Motion data classification, a late fusion approach to multimodality in sign language recognition increases the model's overall capacity. Two deep neural networks are benchmarked and evaluated using a huge synchronous dataset of 18 BSL gestures gathered from several people to determine the optimum architecture for each. A Convolutional Neural Network and an optimised Artificial Neural Network implement the Vision model, while an evolutionary search of Artificial Neural Network topology implements the Leap Motion model. The idea is further confirmed by applying the three models to a set of previously unknown data, which show that a multimodality approach outperforms the single sensor technique.

Problem Statement

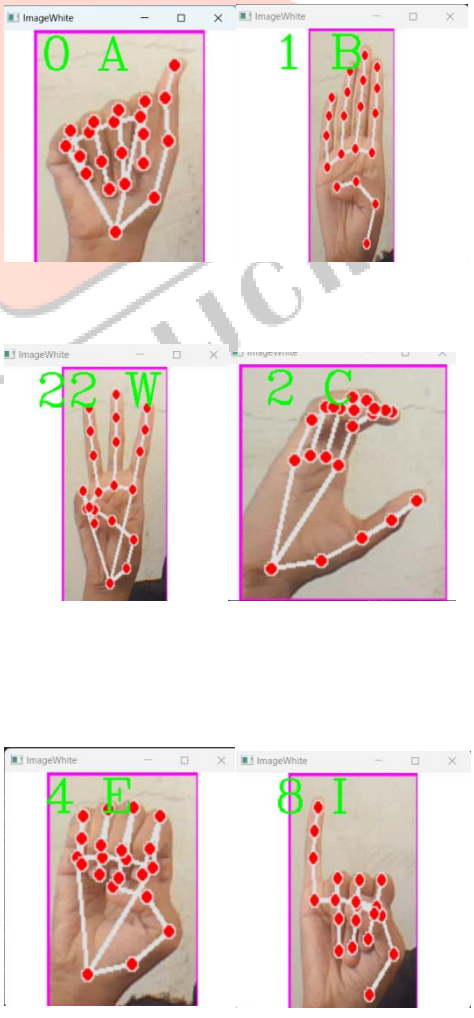
The goal of sign language recognition is to create an system that can accurately recognize and interpret sign language gestures performed by individuals, particularly those who are deaf or dump of hearing. This involves the development of algorithms and models that can process data of sign language movements and translate them into text. However, this task is challenging due to the complexity and variability of sign language gestures, which can vary in terms of location, speed, and style. Therefore, a significant research effort is required to develop robust and accurate sign language recognition systems.

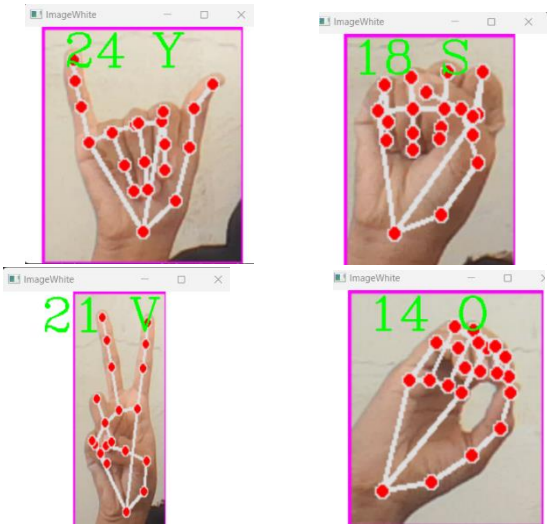
Methodology

A project intend to record signers ' live sign language performance and translate them into text and audio output for illiterate user. Due to the ease of portability and mobility that the camera based method provide over other approaches, a camera based approach will be used for this.The camera capable gadget will first record a image of the signer. then your application will process that image and scan that image in your database, if that image is in your database, then after that a your output will be displayed in the form of text

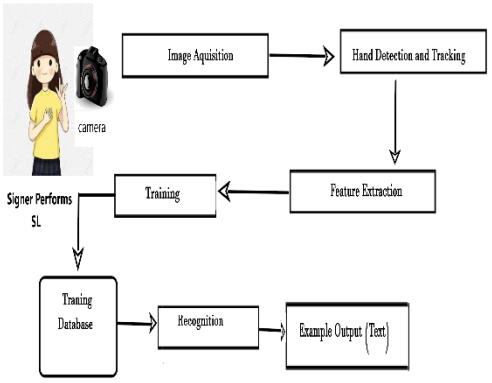
Algorithms :

1. Histogram Calculation:
2. Back Propogation
3. Optimizer:
4. Loss Function





System Architecture



Future Scope

Increase the accuracy of the system and try to maintain different background types.Two hand gesture recognition and explore new features. Improving symbolic expression quality so it can detect alphabets and numbers easily. Using the new develope tool to increase the accuracy of system. As it is Time consuming so we will try to increase the efficiency of system

Conclusion

Sign language recognition technology has made significant advancements in recent years, making it possible to recognize and translate sign language into spoken or written language. This technology has the potential to greatly improve communication for people who are deaf or hard of hearing, as well as make information more accessible to the wider community. However, there are still some challenges that need to be addressed, such as variations in signing across different regions and signers, as well as the need for more robust and accurate recognition models. Further research and development in this area are needed to improve the accuracy and reliability of sign language recognition technology. Overall, sign language recognition technology has the potential to revolutionize communication and make the world a more inclusive place for people with hearing disabilities.

Reference

- "Semantic Boundary Detection with Reinforcement Learning for Continuous Sign Language Recognition" Chengcheng Wei, Jian Zhao, Wengang Zhou, and Houqiang Li 2020
- "Hierarchical Recurrent Deep Fusion using Adaptive Clip Summarization for Sign Language Translation" Dan Guo, Wengang Zhou, Anyang Li, Houqiang Li and Meng Wang 2019
- "Weakly Supervised Learning with MultiStream CNNLSTM-HMMs to Discover Sequential Parallelism in Sign Language Videos"Oscar Koller, Necati Cihan Camgoz, Hermann Ney, Fellow, , and Richard Bowden 2018
- Advances in machine translation for sign language: approaches, limitations, and challenges" Mohd Shafry Mohd Rahim Adnan Abid Nabeel Sabir Khan 2021