

REAL TIME SIGN LANGUAGE RECOGNIZER USING AI

¹Mr. Murtadak Suraj, ²Mr. Kumawat Sattyam, ³Mr. Darekar Rohit, ⁴Mr. Jagdale Vishal, ⁵Patil P. A

^{1,2,3,4}UG Students, ⁵Project Guide
Department of Computer Engineering,
SND College of Engineering and Research Centre, Yeola, India

Abstract: Sign Language detection by technology is an overlooked concept despite there being a large social group which could benefit by it. There are not many technologies which help in connecting this social group to the rest of the world. Understanding sign language is one of the primary enablers in helping users of sign language communicate with the rest of the society. Image classification and machine learning can be used to help computers recognize sign language, which could then be interpreted by other people. Convolutional neural networks have been employed in this paper to recognize sign language gestures. The image dataset used consists of static sign language gestures captured on an RGB camera. Pre-processing was performed on the images, which then served as the cleaned input. The paper presents results obtained by retraining and testing this sign language gestures dataset on a convolutional neural network model using Inception v3. The model consists of multiple convolution filter inputs that are processed on the same input. The validation accuracy obtained was above 90% reviews the various attempts that have been made at sign language detection using machine learning and depth data of images. It takes stock of the various challenges posed in tackling such a problem, and outlines future scope as well

Keywords: Sign Language Recognition, Deep Learning, OpenCV, Convolutional Neural Network, Image Processing.

I. INTRODUCTION

The sign language is used widely by people who are deaf-dumb these are used as a medium for communication. A sign language is nothing but composed of various gestures formed by different shapes of hand, its movements, orientations as well as the facial expressions. There are around 466 million people worldwide with hearing loss and 34 million of these are children. 'Deaf' people have very little or no hearing ability. They use sign language for communication. People use different sign languages in different parts of the world. Compared to spoken languages they are very less in number. India has its own sign language by the name Indian Sign Language (ISL). In developing countries there are only very few schools for deaf students. Unemployment rate among adults with hearing loss are very high in developing countries. Data from Ethnologies states that among deaf population in India, which is about 1 percent of total population, literacy rate and number of children attending school is very less. It goes on to state that official recognition of sign languages, increasing the availability of interpreters and providing transcription in sign languages greatly improve accessibility. Signs in sign languages are the equivalent of words in spoken languages Signed languages appear to favor. The associate editor coordinating the review of this manuscript and approving it for publication was Weiyao Lin. Simultaneous sign internal modification, rather than the concatenation of morphemes. But learners in the initial stages of SL learning use iconicity as a mnemonic aid to remember new signs. But the lack of iconicity makes it difficult to learn new signs for those who learn SL as a new language. Finger spelling is the representation of the letters of a writing system and sometimes numeral systems. Sign Language (ISL) can represent English alphabets A-Z using finger spelling. It can be one handed or two handed and ISL follows two handed style. It issued to represent words that have no sign equivalent or used to emphasize a word Though finger spelling usage is less in casual signing, they are an important component in sign language learning. This project aims at identifying alphabets in Indian Sign Language from the corresponding gestures.

II. MOTIVATION

Highly influenced by the teachings of the Shrimad Bhagavad-Gita we decided work for the people with speaking disability. During academics we had met people with speaking disability, we had seen their problem closely. So that was the biggest motivation for us to create this project.

III. PROBLEM DEFINITION

In the world of technology, everything and everyone in the world is growing so rapidly, so we think disability of deaf people should not be barrier in the growth of deaf people. As technology is changing world so rapidly, so technology can also change the life of such people,

IV. LITERATURE SURVEY

This chapter contains the existing and established theory and research in this report range. This will give a context for work which is to be done. This will explain the depth of the system. Review of literature gives a clearness and better understanding of the exploration/venture. A literature survey represents a study of previously existing material on the topic of the report. This literature survey will logically explain this system.

Real Time Sign Language Interpreter

In this paper Geethu Nath and Arun C.S. developed a system using ARM CORTEX A8 processor for recognizing the ASL symbols.

Continuous Indian Sign Language Gesture Recognition and sentence Formation

In this paper Kumud Tripathi designed a system for recognizing continuous ISL gestures using Principal Component Analysis

(PCA) with various distance classifiers.

Implementation of Real Time Hand Gesture Recognition

The In this paper used the codebook algorithm for background subtraction and generated binary images from the given image frames.

Automatic Indian Sign Language Recognition for Continuous Video Sequence

An eigenvector-based technique is used for feature extraction, and eigenvalue weighted Euclidean distance technique is used for Classification of 24 different ISL alphabets.

Dynamic Hand Gesture Recognition and Novel Sentence Interpretation Algorithm for Indian Sign Language Using Microsoft Kinect Sensor

In this paper Archana S. Ghotkar and Gajanan K. Kharate explored rule based and dynamic time warping (DTW) based method to recognize ISL words.

V. PROPOSED SYSTEM

The non-invasive vision-based recognition method. The vision-based recognition can be achieved in two ways. They are static recognition or dynamic recognition. [5] In static recognition system, the input may be an image of hand pose. It provides an only 2d representation of the gesture, and this can be used to recognize only alphabets and numbers. For recognition of continuous sign language, the dynamic gesture recognition system is used. Here the real-time videos are given as inputs to the system, a sequence of hand movements form the gesture of the word/sentence. Information technology with its modern methodologies such as artificial intelligence and cloud computing has an impressive role in enhancing intercommunication among people with vocal disabilities and normal people.

VI. METHODOLOGY AND ALGORITHM

OPENCV: OpenCV (Open-Source Computer Vision Library) is an open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

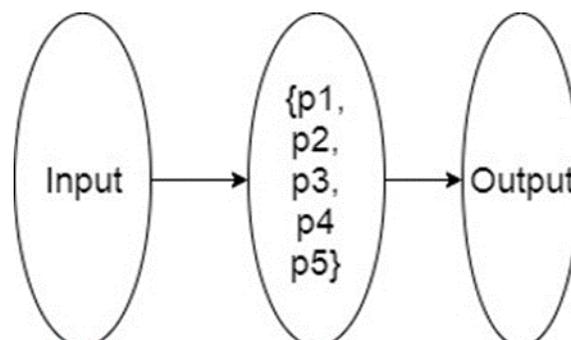
PYQT5 LIBRARY: PyQt5 is cross-platform GUI toolkit, a set of python bindings for Qt v5. One can develop an interactive desktop application with so much ease because of the tools and simplicity provided by this library.

VII. MATHEMATICAL MODEL

Let S be system:
 $S = \{I, A, O\}$
 Input(video/frame)
 $A = \{p1, p2, p3, p4, p5\}$ //Functions
 S: is a System.
 p1: Capture Video.
 p2: Feature Extraction
 p3: Neural Network
 p4: Segmentation
 p5: Recognize Sign Language
 Output(Displaying the Actual Meaning of sign language)

VIII. SYSTEM ARCHITECTURE

The major requirement for implementing this project using python programming language along with the AI & machine learning. Computer vision and also python libraries. It can be use high and low computation scenarios. We are using SVM, Navy Base, Decision tree in our proposed system.



- Dumb deaf people interact with any people
- Easy to use.

APPLICATIONS

- In colleges for deaf people
- In seminar hall for deaf people

XI. CONCLUSION

In this work, we presented a vision-based system to interpret isolated hand gestures from the sign language. This work used two different approaches to classify on the spatial and temporal features. CNN was used to classify on the spatial features, whereas RNN was used to classify on the temporal features. We obtained an accuracy of 95.217 that CNN along with RNN can be successfully used to learn spatial and temporal features and classify sign language gesture videos.

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