Indian Sign Language Recognition System

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Abstract: - The Indian Sign Language (ISL) Recognition System is a system designed to recognize and interpret ISL gestures made for individuals with hearing and speaking impairments. This system aims to improve communication between the deaf and mute communities. The system utilizes computer vision and machine learning techniques to analyze and categorize the ISL gestures into corresponding words. The system has been trained on a large dataset of ISL gestures to improve its accuracy. The recognition process involves capturing the ISL gestures via a camera, pre-processing the captured data, and passing it through a machine learning model to make a prediction. The system can be used in various applications such as sign language translation, sign language learning, and accessibility technology for the deaf.

Keywords — (Python, object detection, Indian Sign Language, Image labelling, TensorFlow,)

I. INTRODUCTION

This project is known as Indian Sign Language Recognition System. This project can be used by the deaf and dumb as well as the general society to communicate easily with the people around them. This project will help the deaf and dumb people to connect more easily with the world. The project will mainly focus on the recognition of the Indian Sign Language. Indian Sign Language is a more diversified sign language than some of the other sign languages around the world. This is mainly due to the huge diversity of our country.

Regarding sign language recognition systems, most of the research and work is done on the American Sign Language (ASL) [2]. There is very less or close to no work or research done on the Indi

Sign Language (ISL). There is a similar project based on sign language recognition system which is uses the American Sign Language. That project is the inspiration and the baseline of our project.

The shortcomings of all the projects and research papers available were that there were close to none based on the Indian Sign Language (ISL). This projects main aim is to recognize the Indian Sign Language and make it more accessible to the world. This project will make the ISL more popular and user friendly for the deaf and dumb people of India.

II. METHODOLOGY/EXPERIMENTAL

A. Components

The implementation of any research requires a careful consideration of its fundamental components. In our research, we have meticulously chosen the most essential tools and frameworks to ensure the utmost precision and accuracy in our findings. Our primary focus revolves around the incorporation of cutting-edge technologies, including *Python, OPENCV, MATLAB, CNN, TensorFlow, and NumPy*. Additionally, our research demands an extensive knowledge of the Indian Sign Language as most the people are fond of American Sign Language but we are are lagging in ISL. Hence, so to ensure a comprehensive understanding of the subject matter. With these robust components, we are confident in achieving groundbreaking results that will contribute significantly to the field.

B. Methodology

The software development process is a critical aspect of any research project, and choosing the right model is of utmost importance.

In our proposed research, we have chosen the Waterfall Model to ensure a streamlined and efficient approach towards achieving our objectives.

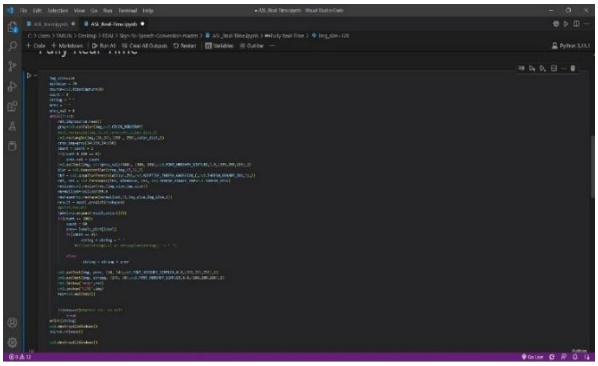
1.)The first stage in this model is the Requirements stage, where we have identified the essential components necessary for our research, including the utilization of cutting-edge software such as Python, OPENCV, and TensorFlow. Additionally, a comprehensive understanding of the Indian Sign Language is crucial to ensure the accuracy and precision of our findings.

2.)Moving on to the Analysis stage, we have thoroughly analyzed our requirements and formulated a clear

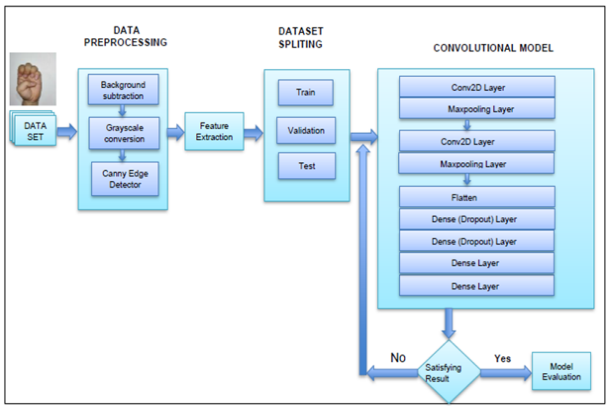
understanding of our research objectives. This step is essential to ensure that our research aligns with our desired outcomes.

3.)Next, in the Design stage, we have developed a basic format of how our code will operate and how the output will be in text format. This step is crucial in ensuring that our research design is sound and aligned with our objectives.

4.)In the Coding stage, we have commenced writing our designed program, ensuring that it adheres to industry standards and best practices. This step is essential to ensure that our code is well-structured and easy to maintain. The code is written according to the design.
This is one of the glimpse of our code:-



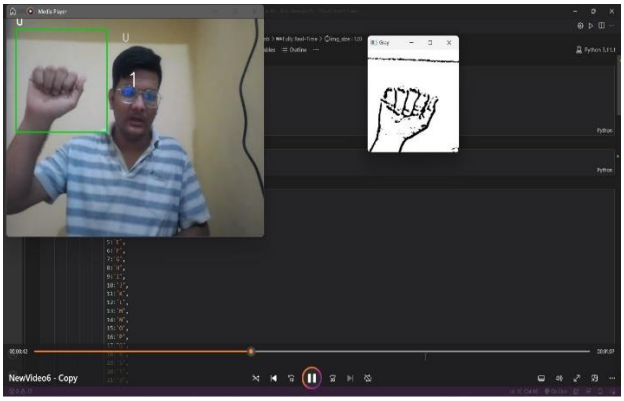
5.)Once our code is complete, we will move on to the Testing stage, where we will run and verify the effectiveness of our program. It is then tested thoroughly to verify if the code is working according to the design and expectations. It is then implemented after successful execution of the code and a much more user-friendly interface is introduced for the project.
This step is essential to ensure that if are our research results are accurate and reliable.
So, this is basically the flowchart we followed so as to execute our programme efficiently:-



6.)Finally, in the Implementation stage, we will introduce a user-friendly interface that will make our program accessible to a broad audience. This step will enable us to disseminate our research findings and make a meaningful impact in the field of Sign Language Recognition System. Overall, our proposed approach is rigorous and designed to ensure that we achieve our research objectives effectively and efficiently.

III. RESULTS AND DISCUSSION

We conducted experiments on the Indian Sign Language Data set which was evaluated on videos
where a person was performing signs.
Currently our system can only detect numbers 1-10 and some of the alphabets.
Our results compared to previous studies on ISL recognition system are a little less.
One limitation of our system is that it was trained and tested on small relative data set which may not be representative of the full ISL signs.
Overall , our proposed Indian sign language recognition system has the potential to benefit the Indian deaf and hard-of-hearing community by enabling them to communicate more effectively.
These are results obtained from our project which demonstrates the effectiveness of our proposed approach:-



IV. FUTURE SCOPE

The future of this project is very important as many other features can be introduced related to this topic. Features like video calling with real time translation can be introduced, an application can be made alongside the website, educational features also can be introduced for

teaching the Indian Sign Language (ISL). Text to sign language can also be introduced as an option. [5]

V. CONCLUSION

The real-life applications of this project are limitless. This project will help a whole lot of people with many things. Communication will be a lot easier for the deaf and dumb people. They will feel more included and accepted in the society. Many people will be educated about the Indian Sign Language (ISL) and its importance.

VII. ACKNOWLEDGMENT

The authors of this project would like to thank Vishwakarma Institute of Technology, Pune and all its members and faculty for providing us with this opportunity to develop and research on this important project. This project has given the members both theoretical and social knowledge. The members got to know about the different technological tools and got the opportunity to learn the Indian Sign Language (ISL).
Even some seniors of our colleges studying in second and third year helped us as a guide.

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