IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

TEXTUALIZING SIGN LANGUAGE USING DEEP LEARNING CNN MODEL

[1]Shilpa S B, [2]Chelvitha A, [3]Peddineni Gnaana, [4]Seethavari Sujana,[5]Shilpa S R

[1]Assistant Professor, [2]Student, [3]Student, [4]Student, [5]Student

Abstract: Textualizing Sign Language, the challenge purpose is to have a look at numerous techniques for effective inter-communication between Sign Language and its impact on communication. English Language. The version can identify almost every alphabet. Various gestures which include each palm have been added to our dataset. This model has big potential as it could interpret any gesture of diverse Sign Languages if provided in the dataset. The consumer can also upload extra gestures within the dataset, making it rather custom-designed. Further, the data exists to an application to convert the obtained textual content to speech.

Index Terms **– Early Detection, Deep learning, CNN Algorithm, Image Processing.**

I. INTRODUCTION

This process takes place in various forms such as speech, signs, actions and pictures. In conveying the ideas to others, people are observed making use of their hands for varied gestures. These nonverbal cues visible and interpreted with sight. The deaf Use sign language to communicate. which is a form of non verbal their communication doesn't involve sign language. made up of words but it's taught by hand movements, body languages including eye contact , lip patterns and facial expressions. Sign language unlike what most people say there is no international sign language. They differ in meaning from each other. one geographical location to another. Consequently, reducing the gap between D&M and non-D&M persons in conversation will be a necessity to ensure effective communication for everyone. parties involved. This is why sign translation has evolved into one of the fastest growing areas in research and provides the most direct form communication for the differently abled. hearing problems or impairments. Using this technology, it becomes possible for deaf individuals to interact with speaking individuals without need of an interpreter.

II. OBJECTIVE

This project aims to detect different hand gestures using different machine-learning approaches applying the CNN algorithm and Kaggle dataset.

III. EXISTING SYSTEM

The Current sign language systems. recognition Usually, computer vision techniques are used to... interpret hand gestures and movements captured through cameras. These systems frequently use machine learning algorithms. to classify and translate these gestures into corresponding spoken or written language. They may also utilize wearable gadgets packed with sensors. to capture hand movements more accurately.

IV. LITERATURE REVIEW

Salma Hayani et al, [1] Real-Time Sign Language Recognition System for: Transforming Sign Language into Action in a Snap. Hearing and Speech Impaired People, proposed an Arab a system for recognizing sign language using... CNN, the Dataset contained 7869 images of Arab signs of numbers and letters. Various experiments were conducted by adjusting the quantity of training sets from 50% to 80%. 90% accuracy was obtained with an 80% training dataset. The author has also compared the Machine learning yielded the results. algorithms like KNN and SVM to show the performance of the system. This model was purely image based and it can be extended to video-based recognition.

Mahesh Kumar, [2] Translating Sign Language to Text Preprocessing steps such as skin segmentation and morphological Operations are applied. dataset. Skin Segmentation employed the use of. algorithm. Linear discriminant analysis determines the best line or plane to separate classes in data. used for feature extraction. during training, every gesture becomes a column vector, which is then normalized. concerning the typical gesture. algorithm Identify eigenvectors of the normalized gestures' covariance matrix. In the recognition phase, the subject Vector normalized. concerning average Gesture then displayed. onto Utilize gestures in spatial communication. an Matrix of eigenvectors. Euclidean distance is computed Between this projection and all others. known projections. The minimum value of these comparisons is selected

Joyeeta Singha and Karen Das, [3] Recognition of Indian Sign Language in Live Video They have proposed a system for Indian sign language recognition from a live video. The System comprises three stages. The pre-processing phase. includes Skin filtering and histogram matching transformed using eigenvalues and eigenvectors. are being considered for the feature extraction stage and Eigenvalue Euclidean distance, adjusted by weights. for classification. The database consisted of 480 images of 24 signs of ISL signed by 20 people. High recognition rate, natural user interaction, simple and efficient approach, and no specialized hardware required are the advantages and the disadvantages are limited scope, static hand posture assumption, limited dataset, background noise sensitivity, and lack of real-time implementation.

Kshitij Bantupalli and Ying Xie, [4] ASL Recognition through Computer Vision Deep learning revolutionizes computer vision. They have worked on the ASL recognition system in the US which works on video sequences using on CNN, LSTM, and RNN. A CNN model named Inception Extracted using spatial features from frames, LSTM for extended sequences. time dependencies and RNN To extract temporal information from the sentence. features. Experiments varied in their execution. varying sample sizes and the dataset consists of 100 different signs performed five signers and Achieving peak accuracy at93% was obtained. The order is then fed Utilize an LSTM for an extended duration time dependencies. SoftMax layer outputs max Pooling layers feed into RNNs to capture temporal features. features After the SoftMax layer.

Tanuj Bohra et al, [5] **Real-Time** Transcribing Sign Language into Text he has Suggested a live interactive sign language system. Improved communication system built using deep learning for computer vision tasks like image processing Techniques such as Skin detection using hand detection. Color segmentation, median blur, and contour detection constitute essential steps in image processing. performed on images of dataset for better results. CNN model trained with large dataset contains 40 class categories. and was able predict 17600 test images in just 14 seconds. with an accuracy of 99%.

V. METHODOLOGY

This methodology serves as a bridge connecting those unable to communicate verbally. the wider public. By utilizing image processing algorithms and neural networks, gestures are translated into appropriate text from the training data, transforming raw images and videos into comprehensible text. The methodology outlines the system's overall architecture, encompassing conceptual design and subsequent design phases with added details. It further delves into the static with dynamic behavior of individual components. The implementation and testing stages of the project are guided by this documentation, with details anticipated to evolve throughout the design process.

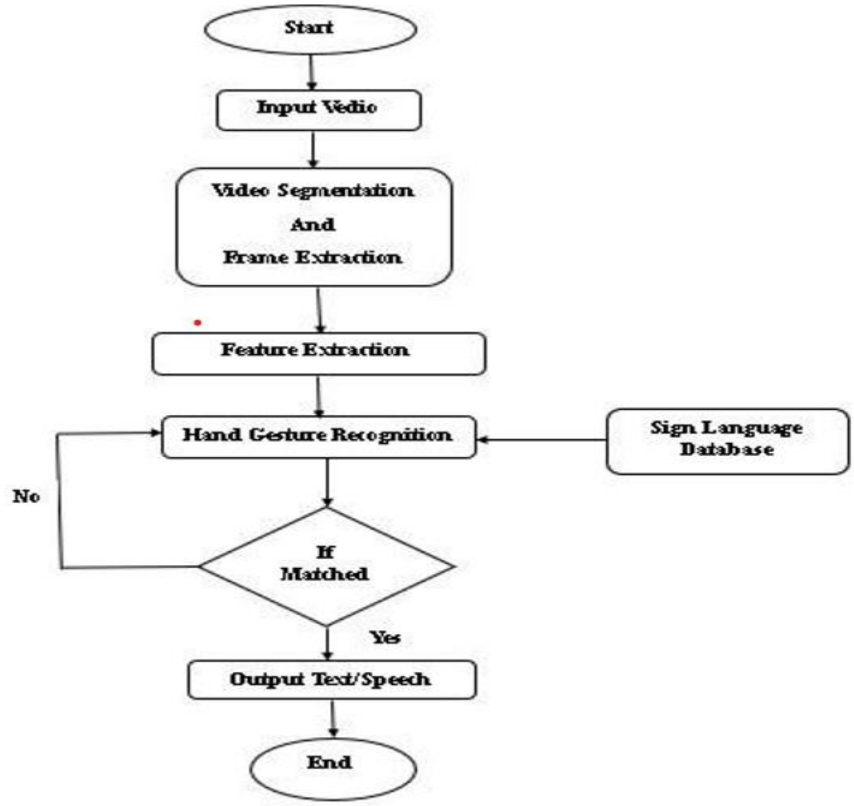

Fig 1: Data flow diagram

Data Acquisition:

Collecting a large and diverse dataset sign language videos: This includes capturing videosfrom various signers with different backgrounds, accents, and signing styles. Annotating the videos with corresponding text or speech: This is crucial for training themachine learning models to recognize and translate signs accurately.

Preprocessing:

Segmenting the videos: This involves breaking up individual gestures from continuous streams of video. Extracting useful features: These include hand shapes, movements, locations alterations in facial expressions and body posture vary based on the context. particular system used. Normalizing the data: It makes representation of data uniform so it can be used effectively for model training.

Modeling:

Choosing appropriate machine learning algorithms: Recognizing sign language. mostly Utilizes deep learning. models such as CNNs because they are able to process complex patterns through visual data. Training the models: In this case, pre-processed data is fed into selected algorithms for understanding relationships between sign features and corresponding text or speech. Fine-tuning the models: This will basically make some adjustments on the models' parameters leading to better results.

Translation:

To create a sign language dictionary: it includes comprehensive mapping of individual signs to their corresponding textual or spoken meanings. Making a translation engine: This necessitates using the trained models for identifying signs for real time and convert them into the required format (either speech or text).

System Integration:

Developing a user interface: What this means is that we should make an interface which is easy for signers to use when they want Interacting with the system needs to be modified. and view texts or voices, which have been translated. Real-time processing: Thus, it to interact with the system the system operate In real-time for facilitate smooth Communication between those who use sign language and those who don't. Accuracy and error correction: It's now crucial for any practical application to achieve high accuracy rates and reduce errors as far as possible. Sign language variations: Different American Sign Language dialects or types must be accounted for by such a system.

Architecture

The sign language translation system uses a kinetic camera sensor, a computer, and a web server. It serves two types of users: the hearing-impaired person who gestures in front of the camera, and the normal user who operates the application. The camera connects to the computer, which interfaces with the database and users. An algorithm compares recorded and current gestures for similarity, displaying corresponding audio and text for successful matches. Normal users can also add new gestures to the database.

Key Components:

Kinetic Camera Sensor: This device captures the sign language gestures were performed by the individual. hearing-impaired user. It's critical for recognizing and interpreting the physical movements that correspond to specific signs.

Computer: The computer is where the ASL translation app. runs. It processes the input from a sensor capturing , compares it against the database of a known gestures, and outputs the corresponding spoken words and text.

Web Server and Database: This component stores the sign language gestures as data sequences So the application can retrieve. This database is essential for allowing the system to recognize and translate new gestures as they are performed.

Users:

Hearing-impaired person: This user communicates via sign language, performing gestures front of kinetic camera. The system translates these gestures into text to spoken words, thereby bridging the communication gap Interacting with non-signers..

Normal person: This user operates the translation application. They can see the translations of the gestures and are also able to contribute by adding new gestures to the database.

Process Flow:

Gesture Capture: As the hearing-impaired person performs a gesture, the kinetic camera sensor captures the movement and sends the data to the system computer.

Gesture Comparison and Translation: The application running at the computer accesses the gesture data, compares it with pre-stored gestures in the database, and identifies the closest match. An algorithm assesses the resemblance among. the performed gesture and the stored sequences to ensure accurate translation.

Output Generation: Once a match is found, the application generates the corresponding text and spoken words are transformed. presented to the normal user. This output helps facilitate communication between the two users.

Updating the Database: The normal user can also input new gestures into the system. These gestures are recorded by the kinetic camera, processed to computer, and stored in a web server's database for future reference. Additional Features and Considerations:

Real-time Processing: The success of a system heavily relies on its ability to process gestures in real-time, providing immediate translation to minimize communication delays.

Accuracy and Learning: Implementing ML algorithms can lead to significant advancements. improve the system's accuracy over time as it learns from new inputs and user interactions.

User Interface: The application should have a user-friendly interface to accommodate both types of users, allowing easy operation and understanding of the system's functionality.

This architecture not only aids in effective communication but also enriches interactions between hearing-impaired individuals and those unfamiliar with sign language, promoting inclusivity.

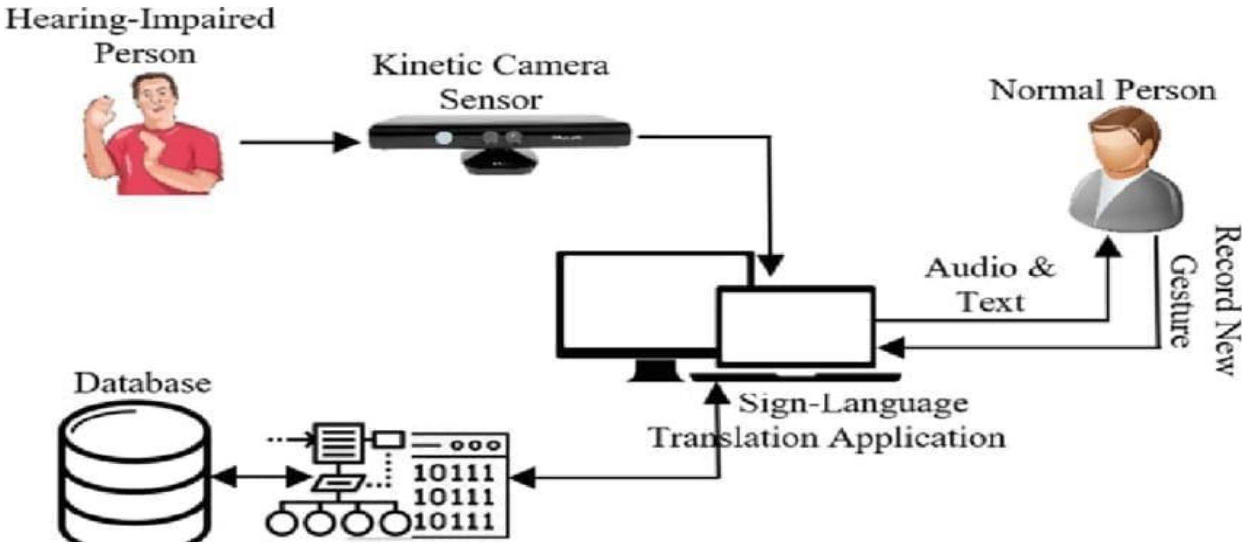

Fig 2: System Architecture

It is chart depicting ASL alphabet. ASL is a complete and natural language used for deaf and hard of hearing people to communicate. It has its own grammar and syntax, distinct from spoken English, and can convey a wide range of ideas and emotions. Similar to spoken languages, ASL has regional variations. The chart shows the hand signs for each of the 26 letters in the alphabet. These hand signs are formed by using different positions of the hand, fingers, and thumb.

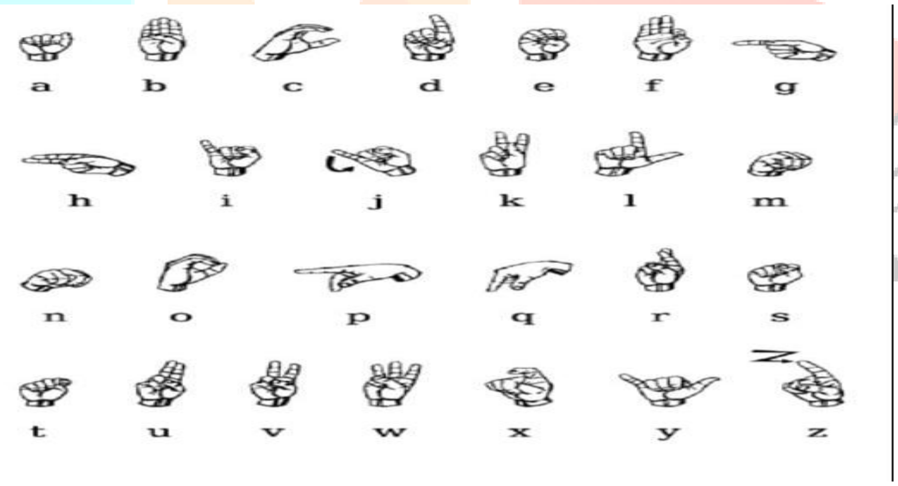

Fig 3: ASL Signs representing Alphabets

V. RESULTS AND DISCUSSION

Fig 4:User Interface

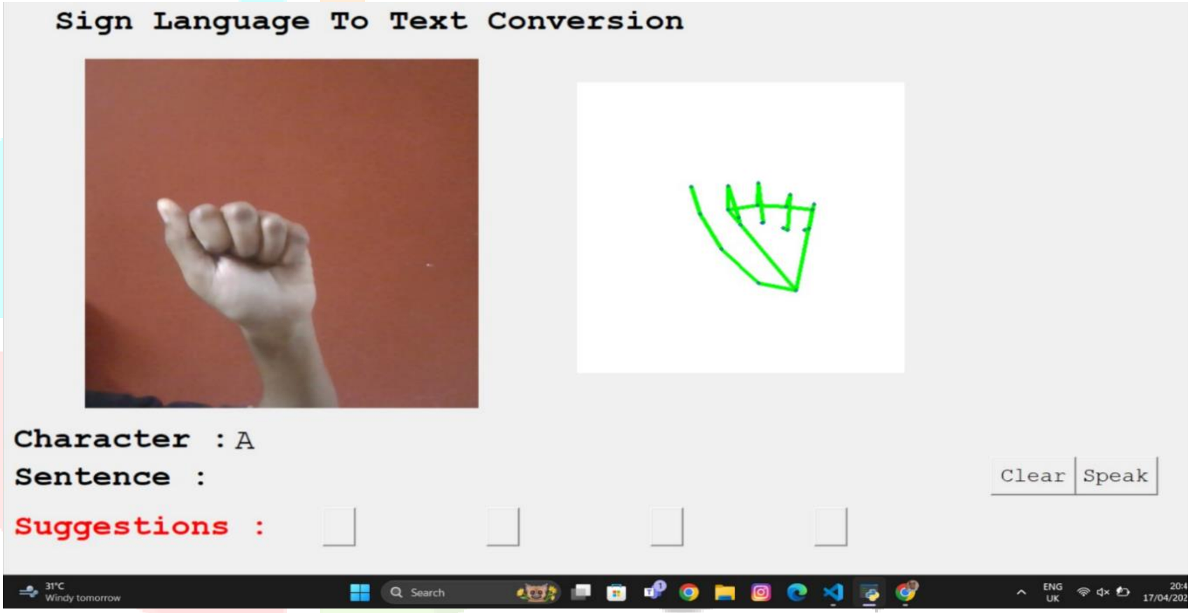

Fig 5: Sign for letter A

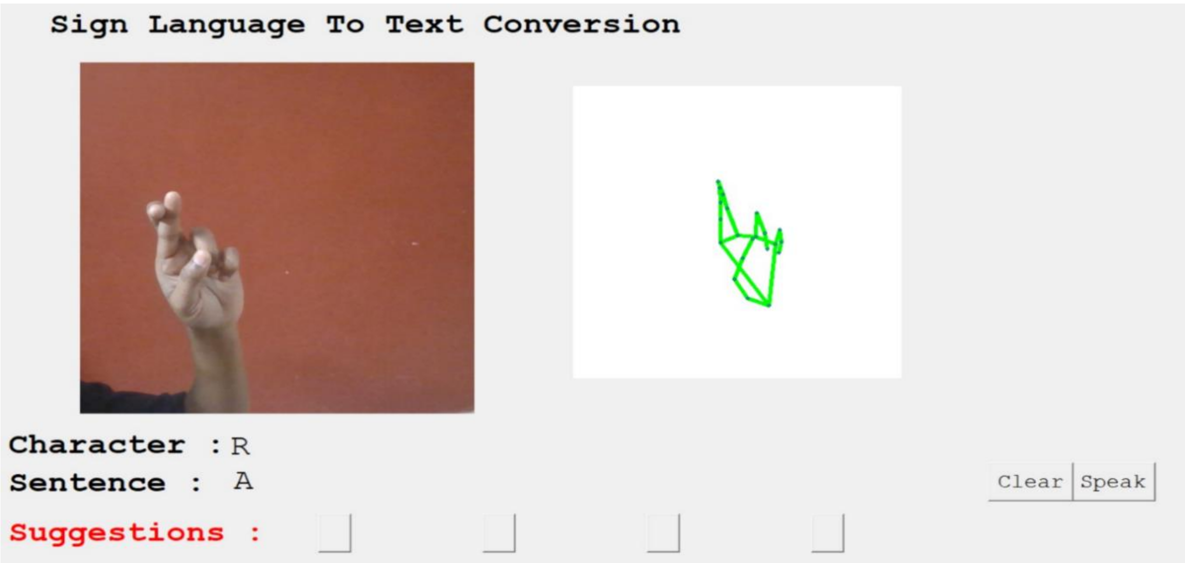

Fig 6: Sign for letter R

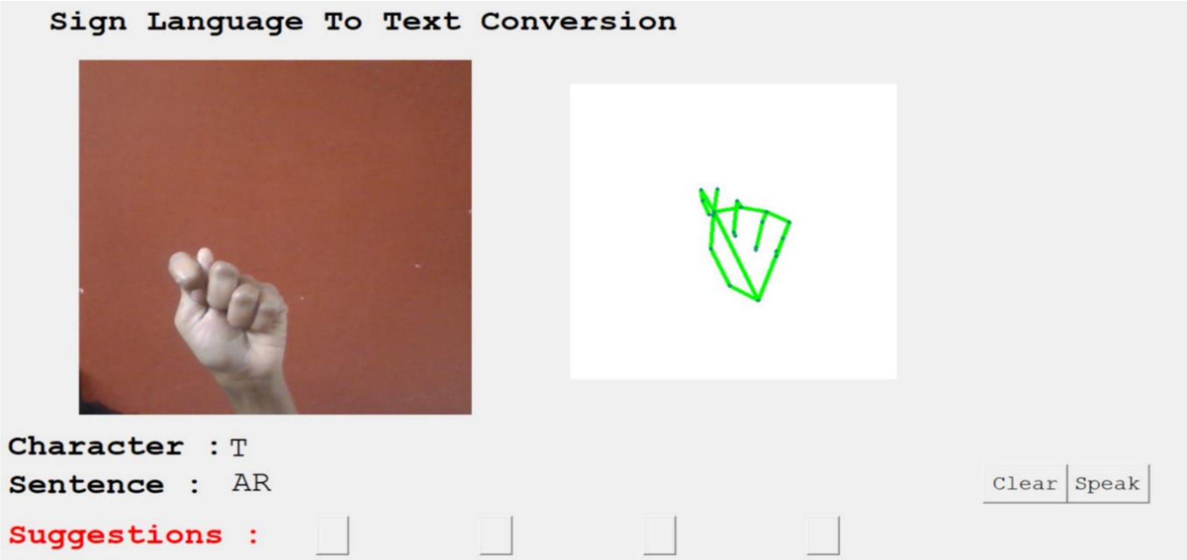

Fig 7: Sign for letter T

The expected outcomes for sign language conversion technology include improved communication accessibility for the Deaf community, enhanced inclusion in various settings, and the capacity to bridge communication gaps between People who use sign language and others don't. Additionally, advancements in sign language conversion can lead to more efficient language learning tools and increased independence for Deaf individuals in daily life.

VII. CONCLUSION

To summarize, sign language conversion efforts strive to connect people can use sign language with those who do not, by employing technology Computer vision, AI, and deep learning wearable devices to accurately interpret and convert sign language gestures into spoken or written words. Progress has been achieved, more research and innovation are necessary to enhance the precision, user-friendliness, and accessibility of these systems, ultimately benefiting the deaf and hard-of-hearing population.

REFERENCES

[1] Guo D, Zhou W, Wang M, Li H. Sign language recognition based on adaptive HMMS with data augmentation. Proceedings - International Conference on Image Processing, ICIP. 2016; 2016-Augus: p. 2876-2880

[2] Jin CM, Omar Z, Jaward MH. A mobile application of American sign language translation via image processing algorithms. Proceedings - 2016 IEEE Region 10 Symposium, TENSYMP 2016. 2016;: p. 104-109.

[3] Shahriar S, Siddiquee A, Islam T, Ghosh A, Chakraborty R, Khan AI, et al. Real-Time American Sign Language Recognition Using Skin Segmentation and Image Category Classification with Convolutional Neural Network and Deep Learning. IEEE Region 10 Annual International

Conference, Proceedings/TENCON. 2019; 2018-Octob(October): p.1168-1171

[4] Ahmed W, Chanda K, Mitra S. Vision based Hand Gesture Recognition using Dynamic Time Warping for Indian Sign Language. In 2016 International Conference on Information Science(ICIS); 2016: IEEE. p. 120-125

[5] Flores CJL, Cutipa AEG, Enciso RL. Application of convolutional neural networks for static hand gestures recognition under different invariant features. Proceedings of the 2017 IEEE 24th International Congress on Electronics, Electrical Engineering and Computing, INTERCON 2017. 2017;: p. 5-8

.