WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

" Sign Language Recognition System for People with Disability using Machine Learning and Image Processing"

Ms. Nirmala M S[1],Shreelakshmi G[2]

[1]Assistant professor Dept. Of ECE. RNSIT nirmala.ms@rnsit.ac.in
[2]Assistant professor Dept. Of ECE. RNSIT Shreelakshmi.g@rnsit.ac.in

Abstract –

One of the primary forms of communication for people with voice impairments is sign language. Among other things, this language expresses its information via a collection of representations, such as finger signs, expressions, or combinations of both. This system offers a unique method for translating sign action analysis, recognition, and text description generation in Kannada using mobile applications. where training and testing are two crucial processes. 50 distinct domains of video samples are gathered for the training set; each domain has five samples, and each video sample is assigned a class of words that are then stored in a database. A median filter, a canny operator for edge detection, and a HOG for feature extraction are used to preprocess the test sample before testing. Using a trained SVM model, SVM predicts the class label given input in the form of HOG characteristics. Lastly, a Kannada-language written description will be produced. In comparison to the traditional model, the average computation time is minimal, the recognition rate is acceptable, and the performance efficiency is validated.

Introduction :

Based on a number of observations of the agents' behaviors and the surrounding environment, the activity recognition seeks to identify the objectives and actions of one or more agents. This area of study has drawn interest from several computer science circles since the 1980s. because of its ability to offer individualized support for a wide range of applications and its links to numerous academic disciplines, including sociology, medicine, and human-computer interaction. Image processing takes input in the form of an image and then processes it according to the specifications.

picture processing requires a variety of inputs, including videos, images, or the collection of video frames. The result is either a picture or a collection of image-related parameters. Feature extraction is the technique of using image processing to enhance the quality of the image and extract valuable information from it. These image processing techniques can be used to a wide range of sectors for a variety of applications, such as hand gesture detection and action analysis. The system created uses these image processing techniques to facilitate communication in a community where members have hearing and speech impairments..

Body language communication is recognized as the primary characteristic that distinguishes a hard-of-hearing population. Ensuring that those who are hard of hearing have equal opportunities and full participation in public life is a crucial aspect of communication by gestures and acknowledgment plots in general society and human growth. A vital aspect of gesture-based communication is the underwriter's constant modification of various hand forms and development.

Through the use of arms, hands, fingers, and eyes, sign-based correspondence allows us to communicate with those who are deaf or in need of a hearing aid. One of the most challenging problems in computer vision is recognizing human movement from visual game plans. This problem has many important applications, such as human-robot collaboration, content-based video recovery, tuning video perception, and magnificent homes. The task presents challenges not just because of class differences, camera improvements, and confusing and disjointed obstacles, but also because of various similarities and differences between classes, such as running versus walking or running. Human movement affirmation in videos has been addressed in the past using general representations.

Generally speaking, development-taking gloves that are configured to unambiguously record finger joint developments with flex sensors in an immovably fitting glove are used to pick up a high data rate of hand positions for dynamic signals affirmation applications. A distinctive and distinctive correspondence philosophy for human-computer interaction is provided by the hand flag. In order for a computer to supposedly see hand gestures continuously, successful human-computer interfaces (HCIs) must be developed. Regardless, the erratic nature of hand signals—which are diverse due to the high degrees of adaptation (DOF) required by the human hand—makes vision-based hand taking after and movement affirmation a challenging problem. The hand movement HCIs must satisfy the requirements for improving execution, affirmation accuracy, and resilience to changes and a disorganized foundation in order to successfully carry out their role.

Semantic analysis of hand imitation, hand forms, hand presentations, sign verbalization, and basic etymological information discussed with head advancements and external appearances are all included in the gesture-based communication correspondence comprehension. Motion-based communication comes from a variety of perspectives and uses a variety of speech patterns, such as hand and facial expressions, references in virtual

spaces, and grammatical intricacies as demonstrated.The biggest drawback of signal-based correspondence affirmation, which differs from talk affirmation, is having to simultaneously view a guarantor's several correspondence attributes, such as their hands and body advancement, outward appearance, and body act. For an affirmation structure to be better than average, these properties must be considered simultaneously. Taking after the underwriter in the confusion of other information by researchers to provide a model for spatial information comprising the components generated in tail able in the video is the second major problem that motion-based correspondence affirmation structure engineers are facing.

PROBLEM STATEMENT :

With 7.6 billion people on the planet today, communication is a powerful tool for mutual understanding. There are around 9,000 million people who are deaf and mute. In order to communicate with the general public, people with discourse impairments need a particular skill, such as the static state of hand orientation to give a sign, which is more commonly known as sign language, a manual-visual dialect. Their voice articulation is also not reasonable. Since many members of the general public do not understand sign language, they believe it is difficult to teach in a public setting. They now find a limited area to communicate and lack the ability to do so over a larger area.

III. BLOCK DIAGRAM :

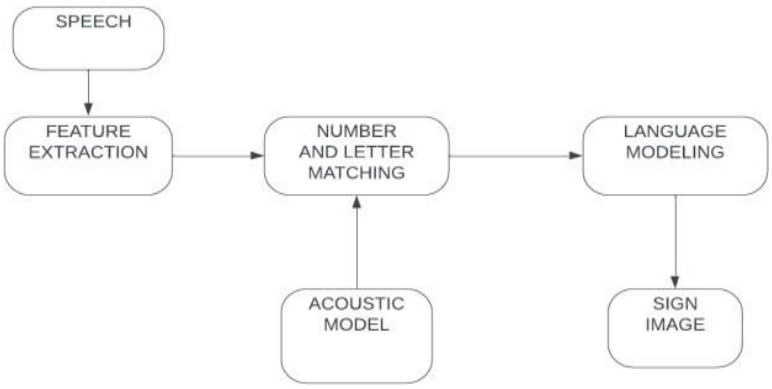


Figure 1: shows block diagram of Sign To Text/Speech

IV. METHODOLOGY :

Complex gesture trajectories can be modeled and recognized using a framework based on Hidden Markov Models (HMMs). The user's hand is identified using a detection algorithm, and a contour-based hand tracker that combines partitioned sampling and condensation is created. The suggested method can successfully reject unusual hand movements and achieve automatic online hand movement recognition. According to the experimental findings, the suggested algorithm can outperform the traditional hand recognition technique in terms of recognition performance. The three main components of the hand gesture recognition system are trajectory recognition, hand tracking, and palm detection.When the device detects an open hand in front of the camera, the hand tracking feature is activated; the HMM-based hand gesture classification is turned off once the user has completed the gesture. The following is the fundamental algorithmic basis of our recognition process: -

Use the hand shape template to initialize the tracker after detecting the palm in the video.

Use a contour-based tracker to follow the hand's movement and note the palm center's trajectory.

Utilizing HMM, which provides the highest likelihood of an observation sequence occurring, classify the gesture.

Machine Learning

It is essential to choose the right strategy; Machine-learning techniques are often used to do this. Machine learning is part of artificial intelligence (AI). It can be defined as an algorithm that focuses on computer program development . Machine learning considered an application that use to increase computer ability to learn from previous experiences.

There are three types of ML:

- **Supervised**: The application has previous experience of new data using labeled examples to predict future events .
- **Semi-supervised**: Data can be labeled and unlabeled for training .
- **Unsupervised**: Data that unlabeled from experience. The system cannot figure out the right input so that the result will be wrong.

Deep Learning

Compared to standard algorithms, neural networks can solve somewhat complicated issues at a much easier level about the complexity of algorithms. Neural networks can solve

somewhat complicated issues at a much easier level concerning the complexity of algorithms. The neural network builds to mimic human brain neural function but with the mathematical functions .

Training Phase

Keeping the pictures in the database served as the foundation for the training phase. There were pictures of both male and female hands in the database. The goal of the training was to recognize any sign that could be made with a single hand. Thirty distinct photos with varying light levels and durations were taken for this purpose and added to the database. These pictures used as training visuals to aid in choosing the best option for each assignment. More than a thousand pictures of distinct hands and signals were in the database.

Gesture Recognition

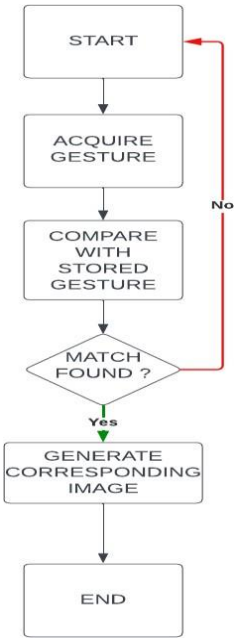
We looked at one method of recognizing simple hand gestures and putting two fundamental gesture controls into practice: mouse clicks and cursor movement.

The computer detects the gesture acquisition by capturing the sign using vision-based recognition.

Clustering algorithms that can consider each finger as a cluster and eliminate the empty spaces between them or multi-scale color feature hierarchies that offer the user's hand and the various background color shades to identify and eliminate the background are two methods for hand tracking. The computer's capacity to monitor the user's hand and distinguish it from the background or other objects is known as hand tracking.The application determines feature extraction. Skin color, finger alignments, palm position, and finger status are all taken into account on D-talk.

Following feature extraction, the result was obtained by submitting the features to training and testing classification algorithms.

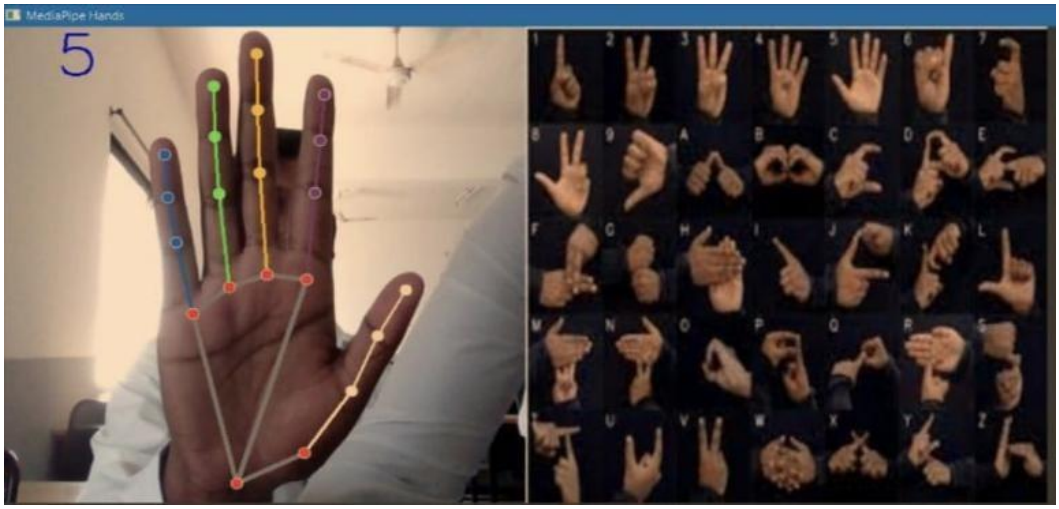
V. FLOW CHART :



The created artificial intelligence has the ability to recognize hand gesture match faults and will automatically cease. It will produce matching motions that enable each Start Get a gesture Compare with the gestures that are saved. Found a match? Create the corresponding image. Allow the user to read and comprehend the meaning of the gesture. It is an extremely important step in the testing process that demonstrates the system's efficacy and efficiency in real-world application. The proposed project facilitates communication for those who are deaf-dumb. It is a step toward developing other technologies that will be the most effective means of assisting those with efferent capacities.

vi .Result :

These are some results from the project where we describe how a sign operates in the signer's space using the five parameters of ISL. Hand form, palm orientation, movement, placement, and expression/non-manual signals are the parameters. Twice, the rule sign touches the palm of your non-dominant hand with the tip of a "R" hand. language that differs from English in grammar yet shares the same linguistic characteristics as spoken languages. ISL is communicated by hand gestures. Institutions and locations where deaf and hearing people communicate urgently need ISL interpreters. In an effort to improve accessibility for those who are hard of hearing



REFERENCES :

[1] Muhammad Rizwan Abid, Emil M. Petriu, Fellow, IEEE, and Ehsan Amjadian, "Dynamic Sign Language Recognition for Smart Home Interactive Application using Stochastic Linear Formal Grammer ", IEEE Transactions On Instrumentation And Measurement, Vol. 64, No. 3, March 2015.

[2]. Houssem Lahiani, Mohamed Elleuch and Monji Kherallah, "Real Time Hand Gesture Recognition System for Android Devices", 2015, 15th International Conference on Intelligent Systems DeSign and Applications (ISDA). https://doi.org/10.1109/ISDA.2015. 7489184

[3]. Ibraheem N.A., Khan R.Z.,: Vision based gesture recognition using neural networks approaches: a review. International Journal of human Computer Interaction (IJHCI). 3(1), (2012).

[4]. Rishabh Agrawal and Nikita Gupta, "Real Time Hand Gesture Recognition for Human Computer Interaction", 2016 IEEE 6th International Conference on Advanced Computing.

[5]. Symeonidis K.,: Hand Gesture Recognition Using Neural Networks, MS Thesis. University of Surrey, UK, (2000).

[6]. Ranganath C.W. Ng, S.,: Real-time gesture recognition system and application, Image and Vision Computing, Vol. 20, Issues 13-14, pp. 993-1007, (2002).

[7]. Emil M. Petriu, Qing Chen and Nicolas D. Georganas, Real-time vision-based hand gesture recognition using haar-like features, 2007.

[8]. Nasser H. Dardas and Nicolas D. Georganas, "Real-time handGesture detection and recognition using bag-of-features and support vector machine techniques", *IEEE* transactions on instrumentation and measurement, 2011.