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SIGN LANGUAGE RECOGNITION

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE ENGINEERING

Karan Bhavsar(190305105703)
Raj Ghatiya (190305105707)
Aarti Gohil (190305105708)
Devanshi Thakkar (190305105726)

Under the guidance of

Bhumi Shah

(ASSISTANTPROFESSOR)

Abstract – Every day we see many people who are facing illness like deaf, dumb and blind etc. They face difficulty to interact with others. Previously developed techniques are all sensors based and they didn't give the general solution. The main aim of the proposed project is to develop a cost effective system which can give voice to voiceless people with the help of Smart Gloves. With the proposed work sign language is converted into text and speech using flex sensor and microcontroller. It means that using smart gloves communication will not be a barrier between two different communities.

I. INTRODUCTION

The challenge faced by dumb and deaf people while communicating with the system in work place , since they cannot hear it, dangerous to go places alone because they cannot hear car, bikes, or other people coming. They cannot adapt to the surrounding environment quickly and respond to other normal people and expressing themselves is hard. The record history of sign language in western societies starts in the 17th century as a visual language or method of communication. Sign language is composed of a system of conventional gesture, mimic, hand sign and figure spelling, plus the use of hand position to represent letters of the alphabet. Sign can also represent complete idea or phrase. The main purpose is to provide speech and text output using hand gesture sign language without using any sensor for dumb people in smart way.

II. PROBLEM STATEMENT

- The problem statement revolves around the idea of a camera based sign language recognition system that would be in use for the deaf for converting sign language gestures to text and then text to speech. Our objective is to design a solution that is intuitive and simple.
- Dumb people use hand signs to communicate, hence normal people face problem in recognizing their language by signs made. Hence there is a need of the systems which recognizes the different signs and conveys the information to the normal people.

III. PROPOSED SYSTEM

In the proposed system the unable or dumb person should provide a gesture or sign image to the system. The system evaluates the sign input with mat lab image processing technique and classifies the input to the recognized identification. Later it initiates the voice media through the system when the input image matches with the given dataset. And the output will be shown in the text format too. This is a prototype to develop the concept of converting the sign language to speech and text.

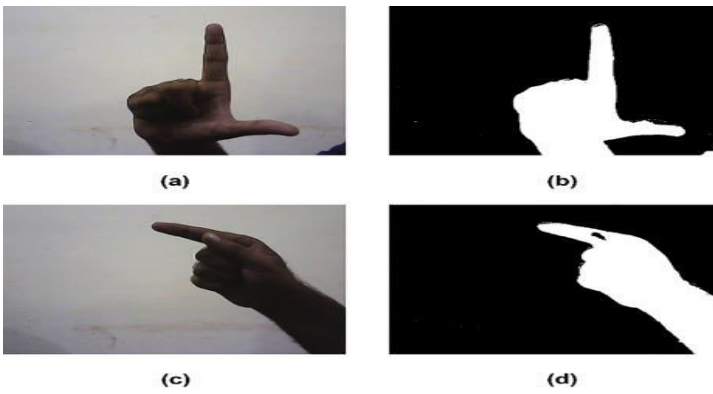

Fig-1: hand gesture images

IV. ADVANTAGES OF PROSED SYSTEM

- When comparing with existing system user can give more signs
- The module provides two way communications which helps in easy interaction between the normal people and disables
- Easy to Interface
- Flexible

V. SYSTEM ARCHITECTURE

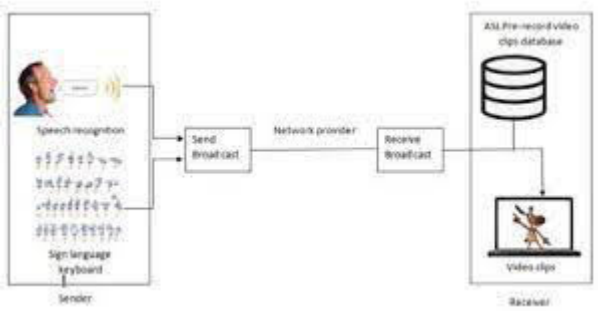

Fig-2: Overall System Architecture

- A deaf person signs through the sign language keyboard displayed in an application as shown in Figure 2
- Software translates signs into text and SL video through interpretation process
- The hearing person read it or view the sign language video extracted through hand speak.
- The hearing person and deaf people speak into microphone which is recognized through Google server.
- The deaf person reads it and sees SL video as the sent
- SMS is stored in the inbox which can be seen at any time.

We have two existing systems

- Communication through cell (with dialing number)
- Face to face communication (without dialing number).

VI. DESIGN

▪ DATAFLOW DIAGRAM

The DFD is also known as bubble chart. It is a simple graphical Formalism that can be used to represent a system in terms of the input data to the system, various Processing carried out on these data, and the output data is generated by the system. It maps out the flow of information for any process or system, how data is processed in terms of inputs and outputs. It uses defined symbols like rectangles, circles and arrows to show data inputs, outputs, storage points and the routes between each destination. They can be used to analyse an existing system or model of a new one. A DFD can often visually "say" things that would be hard to explain in words and they work for both technical and non-technical. There are four components in DFD:

1. External Entity
2. Process
3. Data Flow
4. data Store

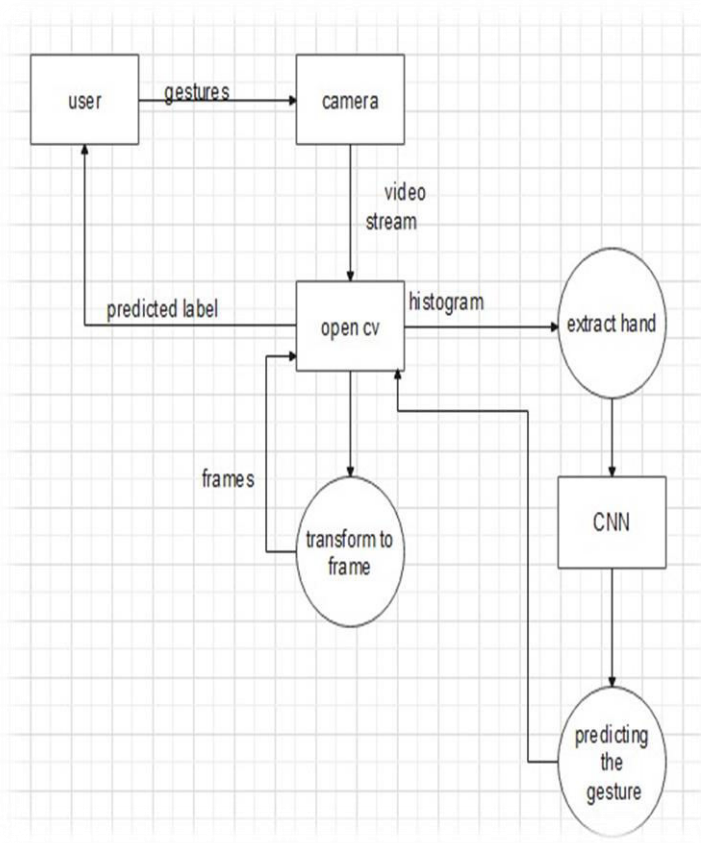

Fig-3:Dataflow Diagram for Sign Language Recognition

▪ USECASE DIAGRAM

Use Case during requirement elicitation and analysis to represent the functionality of the system. Use case describes a function by the system that yields a visible result for an actor. The identification of actors and use cases result in the definitions of the boundary of the system i.e., differentiating the tasks accomplished by the system and the tasks accomplished by its environment. The actors are outside the boundary of the system,
whereas the use cases are inside the boundary of the system. Use case describes the behavior of the system as seen from the actor's point of view. It describes the function provided by the system as a set of events that yield a visible result for the actor. Purpose of Use Case Diagrams The purpose of use case diagram is to capture the dynamic aspect of a system. However, this definition is too generic to describe the purpose, as other four diagrams (activity, sequence, collaboration, and State chart) also have the same purpose. We will look into some specific

purpose, which will distinguish it from other four diagrams.

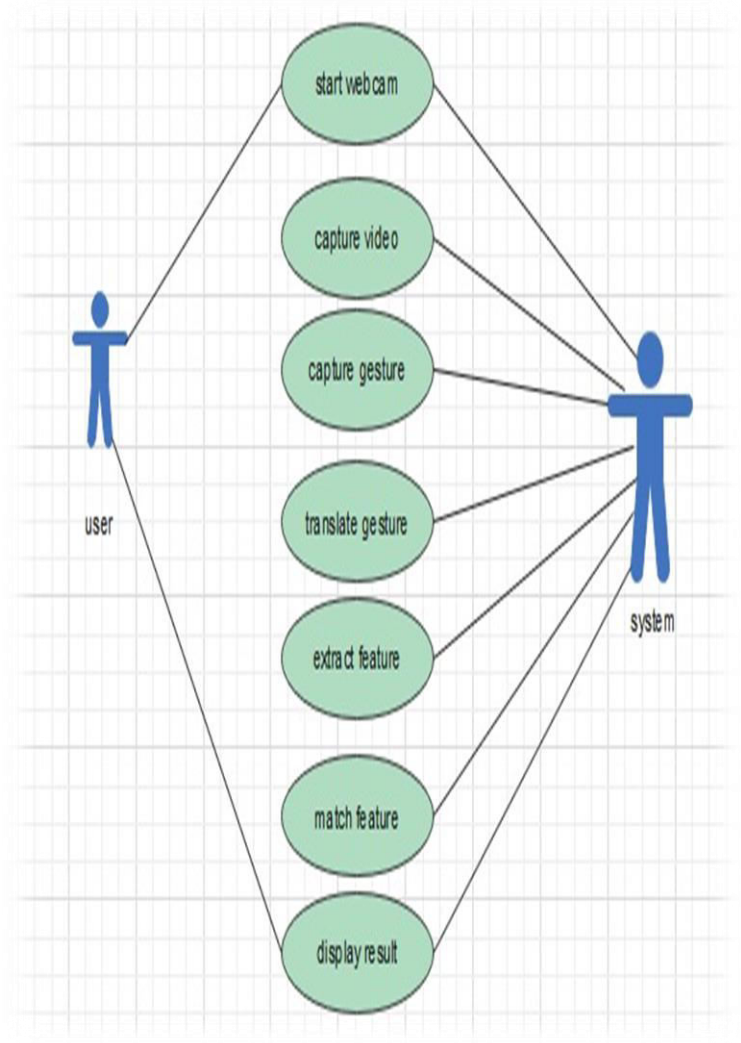

Fig 4: Use case diagram of sign language recognition System

Usecase name	Sign language recognition
Participating actors	User, System
Flow of events	Start the system(u) Capturing video(s) Capture gesture(s) Translate gesture(s) Extract features(s) Match features(s) Recognizing gesture(s) Display result
Entry condition	Run the code
Exit condition	Displaying the label
Quality requirements	Cam pixels clarity , good light condition

Table-1: Usecase Scenario for sign language recognition system

- CLASS DIAGRAM

Class diagrams model class structure and contents using design elements such as classes, packages and objects. Class diagram describe the different perspective when designing a system-conceptual, specification and implementation. Classes are composed of three things: name, attributes, and operations. Class diagram also display relationships such as containment, inheritance, association etc. The association relationship is most common relationship in a class diagram. The association shows the relationship between instances of classes

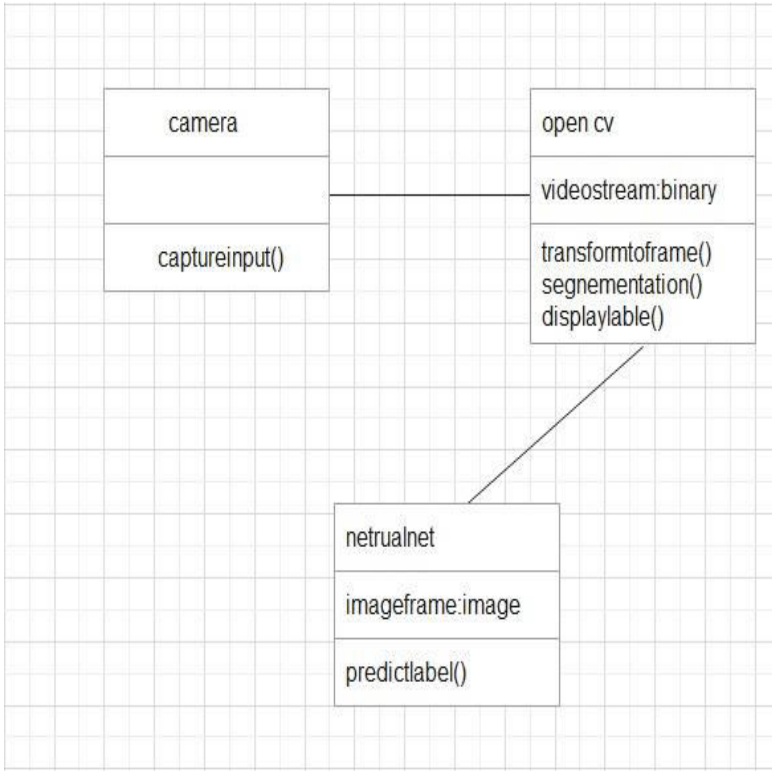

Fig-5: Class diagram of sign language recognition system

- SEQUENCE DIAGRAM

Sequence diagram displays the time sequence of the objects participating in the interaction. This consists of the vertical dimension (time) and horizontal dimension (different objects). Objects: Object can be viewed as an entity at a particular point in time with specific value and as a holder of identity. A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the Logical View of the system under development. Sequence diagrams are sometimes called event diagrams or event scenarios. A sequence diagram shows, as parallel vertical lines (lifelines), different processes or objects that live simultaneously, and, as horizontal arrows, the messages exchanged between them, in the order in which they occur. This allows the specification of simple runtime scenarios in a graphical manner.

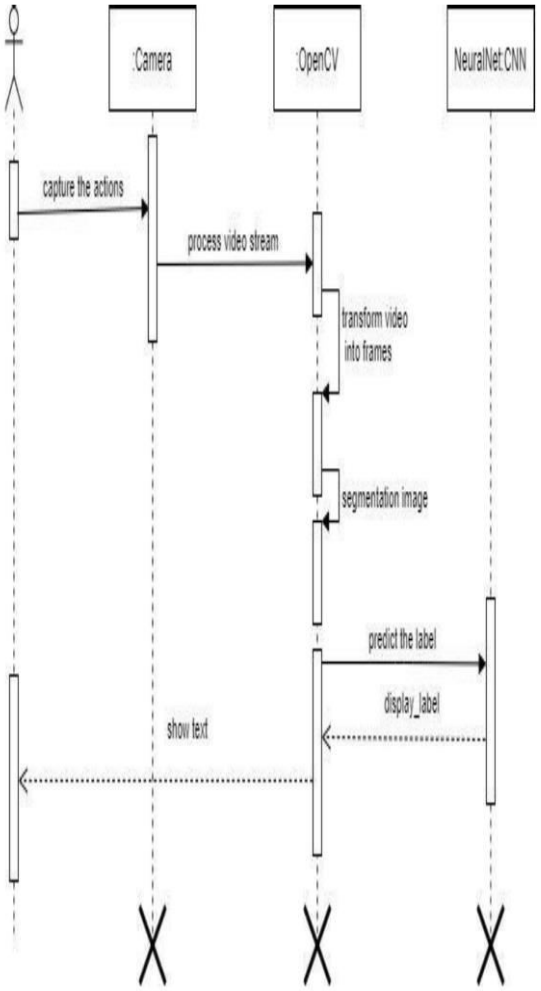

Fig-6: Sequence diagram of sign language recognition system

- STATE CHART

A state chart diagram describes a state machine which shows the behavior of classes. It shows the actual changes in state not processes or commands that create those changes and is the dynamic behavior of objects over time by model1ing the life cycle of objects of each class. It describes how an object is changing from one state to another state. There are mainly two states in State Chart Diagram: 1. Initial State 2. Final-State. Some of the components of State Chart Diagram are:
State: It is a condition or situation in life cycle of an object during which it's satisfies same condition or performs some activity or waits for some event.
Transition: It is a relationship between two states indicating that object in first state performs some actions and enters into the next state or event.

Event: An event is specification of significant occurrence that has a location in time and space

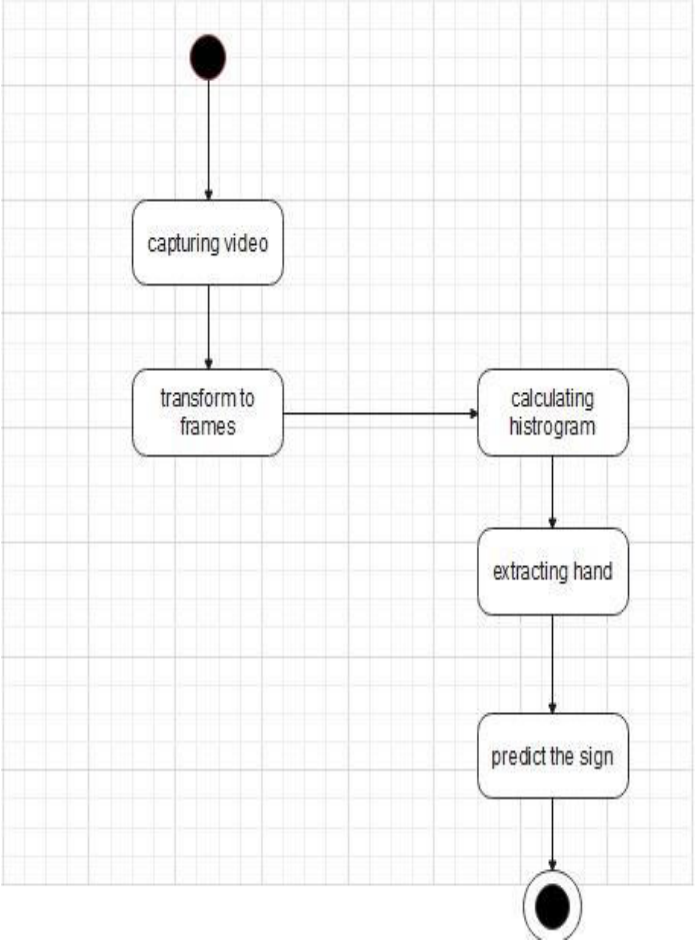

Fig-7:State Chart diagram of sign langua..ge recognition system

VII. EXPERIMENTAL ANALYSIS AND RESULTS

- SYSTEM CONFIGURATION

• Software requirements Operating System : Windows, Mac, Linux

• SDK: OpenCV ,TensorFlow, Keros, Numpy

• . Hardware Requirements

The Hardware Interfaces Required are:

• Camera: Good quality,3MP

• Ram: Minimum 8GB or higher

• GPU: 4GB dedicated

• Processor: Intel Pentium 4 or higher

• HDD: 10GB or higher

• Monitor: 15” or 17” color monitor

• Mouse: Scroll or Optical Mouse or Touch Pad

• Keyboard: Standard 110 keys keyboard

VII. CONCLUSION AND FUTURE SCOPE

Nowadays, applications need several kinds of images as sources of information for elucidation and analysis. Several features are to be extracted so as to perform various applications. When an image is transformed from one form to another such as digitizing, scanning, and communicating, storing, etc. degradation occurs. Therefore, the output image has to undertake a process called image enhancement, which contains of a group of methods that seek to develop the visual presence of an image. Image enhancement is fundamentally enlightening the interpretability or awareness of information in images for human listeners and providing better input for other automatic image processing systems. Image then undergoes feature extraction using various methods to make the image more readable by the computer. Sign language recognition system is a powerful tool to prepare an expert knowledge, edge detect and the combination of inaccurate information from different sources. the intend of convolution neural network is to get the appropriate classification

- FUTURE WORK

The proposed sign language recognition system used to recognize sign language letters can be further extended to recognize gestures facial expressions. Instead of displaying letter labels it will be more appropriate to display sentences as more appropriate translation of language. This also increases readability. The scope of different sign languages can be increased. More training data can be added to detect the letter with more accuracy. This project can further be extended to convert the signs to speech. The sign language start in android Mobile.

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