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Sign Language Recognition

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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 major goal of the proposed project is to create a cost-effective system that uses Smart Gloves to provide voice to the silent. Using a flex sensor and a microprocessor, the suggested method converts sign language into text and speech. It means that communication between two communities will not be hampered by the use of smart gloves.

INTRODUCTION

Dumb and deaf persons experience difficulties connecting with computers in the workplace because they cannot hear them. It is also risky to travel places alone since they cannot hear cars, bikes, or other people approaching. They can't immediately adapt to their surroundings or respond to other people, and expressing oneself is difficult. Sign language has a long history in western societies as a visual language or technique of communication, dating back to the 17th century. Traditional gestures, mimics, hand signs, and figure spelling, as well as the use of hand position to represent letters of the alphabet, make up sign language. A sign can also represent an entire thought or statement. The major goal is to deliver speech and text output for deaf persons utilising hand gesture sign language without the use of any sensors in a smart method.

PROBLEM STATEMENT

- The problem statement centres around the concept of a camera-based sign language recognition system for the deaf, which would transform sign language gestures to text and subsequently text to speech. Our goal is to create a user-friendly and straightforward solution.
- Dumb individuals communicate via hand signs, thus normal folks have a hard time understanding what they're saying. As a result, systems that recognise various signs and deliver information to ordinary people are required.

PROPOSED SYSTEM

The unable or deaf person should submit a gesture or sign image to the system in the proposed system. The system uses a mat lab image processing technique to analyse the sign input and classifies it for recognised identification. When the input image matches the specified dataset, it then starts the voice media through the system. In addition, the output will be displayed in text format. This is a working prototype for the conversion of sign language to speech and text.

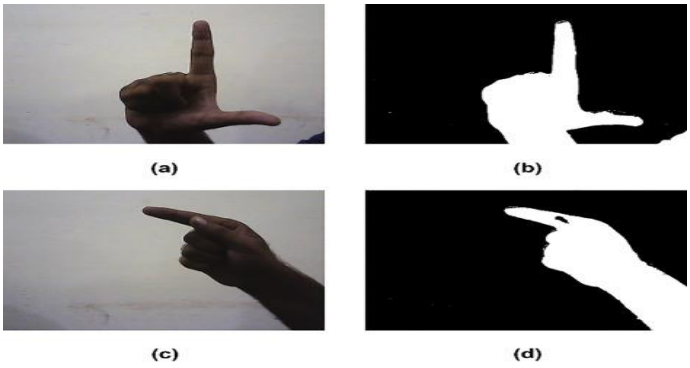

Fig-1: hand gesture images

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

SYSTEM ARCHITECTURE

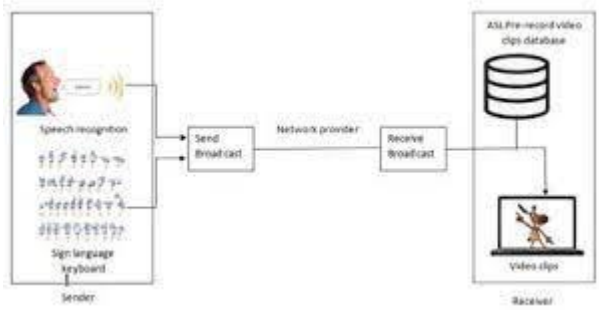

Fig-2: Overall System Architecture

- 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 signlanguage 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).

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

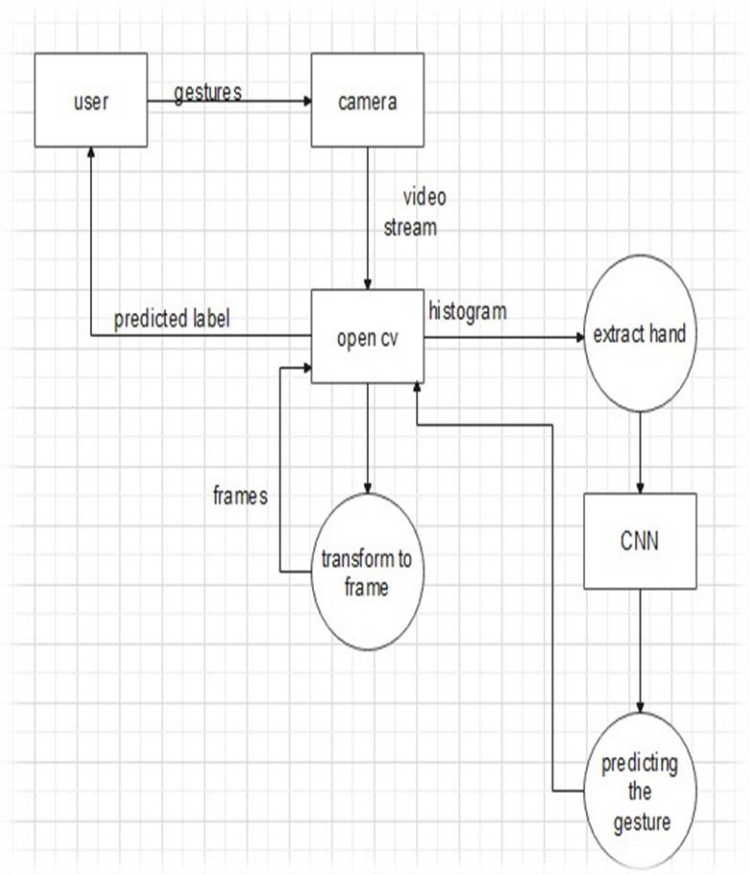

Fig-3:Dataflow Diagram for Sign Language Recognition

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 on the outside of the system's border, whilst the use cases are on the inside. The behaviour of the system as viewed through the eyes of the actor is described in a use case. It explains the system's role as a series of events that result in a visible consequence for the actor. Use Case Diagrams: What Are They Good For? The objective of a use case diagram is to capture a system's dynamic nature.. 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.

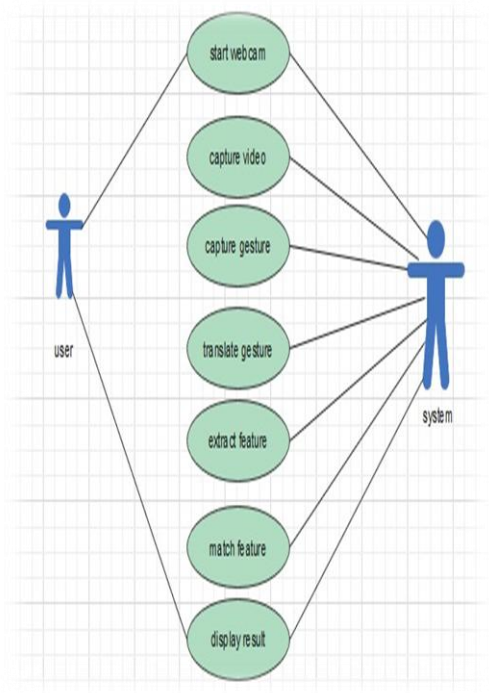

Fig 4: Usecase diagram of sign language recognition System

Table-1: Usecase Scenario for 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

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

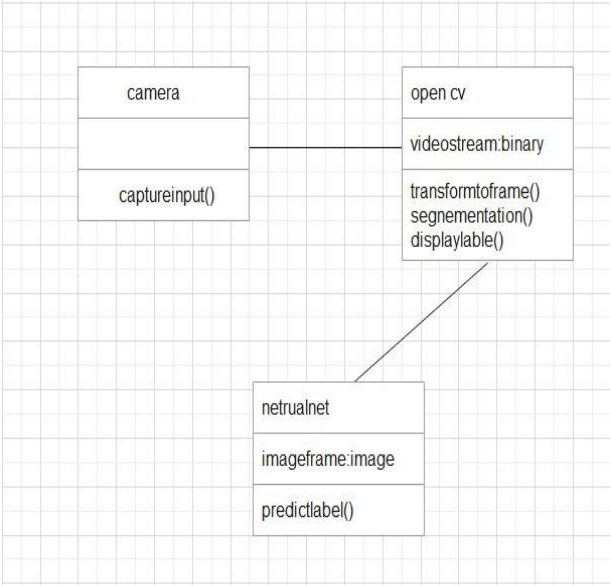

Fig-5: Class diagram of sign language recognition system

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: An object can be thought of as an entity that exists at a specified time and has a definite value, as well as a holder of identity. A sequence diagram depicts item interactions in chronological order. It illustrates the scenario's objects and classes, as well as the sequence of messages sent between them in order to carry out the scenario's functionality. In the Logical View of the system under development, sequence diagrams are often related with use case realisations.

Event diagrams and event scenarios are other names for sequence diagrams. A sequence diagram depicts multiple processes or things that exist simultaneously as parallel vertical lines (lifelines), and the messages passed between them as horizontal arrows, in the order in which they occur. This enables for the graphical specification of simple runtime scenarios..

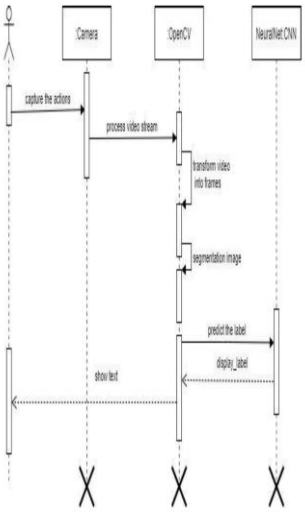

Fig-6: Sequence diagram of sign language recognition system

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

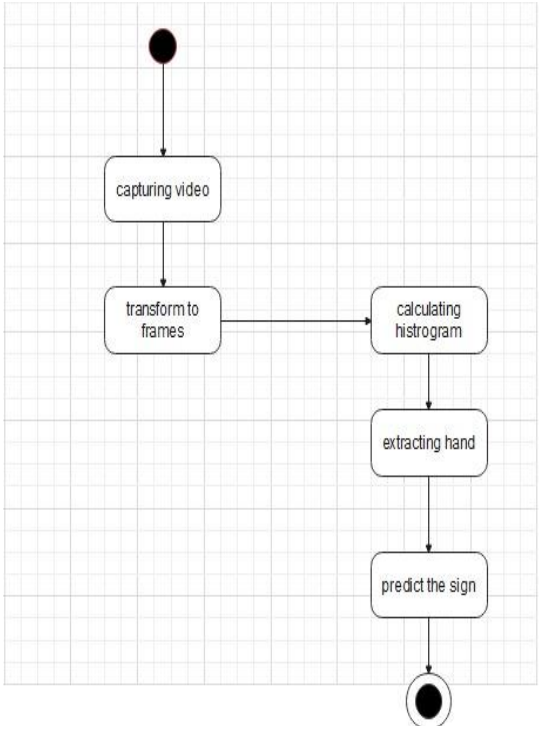

Fig-7:State Chart diagram of sign langua..ge recognition system

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. Degradation occurs when a picture is converted from one form to another, such as when digitising, scanning, sharing, storing, and so on. As a result, the resulting image must go through an image enhancement process, which consists of a collection of approaches aimed at improving an image's visual presence. Image enhancement improves the interpretability or awareness of information in images for human listeners while also giving superior 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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