International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 01 | Jan 2023 www.irjet.net p-ISSN: 2395-0072

SLIDE PRESENTATION BY HAND GESTURE RECOGNITION USING MACHINE LEARNING

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ABSTRACT

The main focus of study in the field of Human Computer Interaction (HCI) in recent years has been on a natural interaction technique. Applications of real-time hand gesture-based recognition have been implemented in many settings where we interface with computers. The detection of hand motions is dependent on a camera. The primary way of engagement involves creating a virtual HCI device using a web camera. In this work, hand motions employed in contemporary vision-based Human Computer Interaction techniques are examined. This project is very helpful in a situation where the users cannot use any kinds of input devices or touch them, with the help of gesture recognition one can easily do a specific action needed without having to physically access the input methods for example mouse keypad etc . The user can draw using his index finger and he can use a pointer by using two fingers that is his index finger and middle finger. The user can undo the drawing using three fingers that is index, middle and ring finger. The user can move to next file by using little finger and to the previous file using thumb finger pointing to left.

Keywords: Hand Posture, Hand Gesture, Human Computer Interaction (HCI), Segmentation, Feature Extraction, Classification Tools, Neural Networks.

I. INTRODUCTION

Hand gestures are an vital a part of nonverbal communique and shape an indispensable part of our interactions with the environment. Gesture popularity and category systems can aid in translating the gestures. moreover, hand gesture category is a crucial tool in human-pc interplay. these gestures may be used to manipulate equipment within the administrative center and to update traditional enter gadgets which includes a mouse/keyboard in virtual reality programs. There are two fundamental processes within the class of hand gestures. the primary approach is the imaginative and prescient-based totally approach. This entails using cameras to collect the pose and movement of the hand and algorithms to procedure the recorded pix. although this method is famous, it's miles very computationally in depth, as photos should undergo giant preprocessing to phase capabilities consisting of the photo's colour, pixel values, and form of hand. moreover, the modern geopolitical climate prevents the big application of this technique due to the fact customers are less inclined to the placement of cameras of their non-public area, mainly in packages that require consistent monitoring of the arms.

II. LITERATURE REVIEW MATERIALS AND METHODOLOGY

Hand gesture recognition is one of the most viable and popular solution for improving human computer interaction.

There are five main processes in a system that recognises hand gestures using vision. The five main procedures are input image acquisition, pre-processing, feature extraction, gesture classification, and development of an appropriate command for the system [.

The pre-processing stage and feature extraction stage of a vision-based, gestural controllable HCI system use a variety of techniques. A major source of inspiration for HCI researchers has been the creation of an intelligent and effective human-computer interface that allows users to interact with computers in brand-new ways beyond the conventional limitations of the keyboard and mouse. The most prevalent uses of visual sensors nowadays are in robotics, visual surveillance, industry, and medical. Applications such as industrial robot control, hand gesture recognition using vision, Translation of sign language, intelligent surveillance, lie detection, manipulation of the visual environment, and rehabilitation of those with physical disabilities of the upper extremities .

An essential sort of input method, vision-based hand gesture recognition algorithms also have the benefit of being discrete and may be a natural way of interacting with machines. Accurate gesture detection at various angles is a difficult element of this method. The primary objective of this paper is to examine some of the most recent developments in vision-based hand gesture recognition systems for HCI.To determine whether it is feasible to identify human activity using hand gesture analysis, to compile information on best practises in the design and development of a vision-based hand gesture recognition system for human-computer interaction, as well as to research design issues and challenges in the field. Here, the various vision-based hand gesture detection systems for human-computer interaction are analysed qualitatively to determine their advantages and disadvantages. A suggestion is also given regarding potential developments for these systems in the future.

The primary issues raised in this study might be summarised as follows:

• Identify Human Computers with Camera Vision strategies for hand gestures during interaction.

• Compile and evaluate the methods employed for developing hand gesture recognition using vision human-computer interaction system

• Describe the advantages and disadvantages of each system.

• Infer potential augmentations and enrichments.

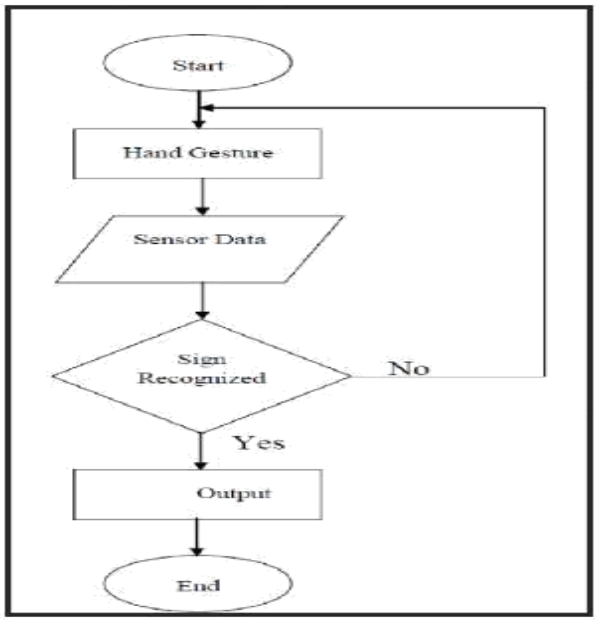
The main goal of this study is to control any computer vision algorithm-based application by using the two most significant ways of interaction—the head and the hand. Segmenting of the video input stream is done. Based on the shape and pattern of the hand's motion, the appropriate gesture is identified. The head movement is represented by a hidden Markov model. Pre-processing for recognising hand and head gestures 1st Take a picture with the camera. Second: The Viola Jones algorithm is used to detect hands and faces. An artificial neural network is used to train classifiers to recognise hands and faces in photographs. The region of the head can be determined using face detection. Method for recognising head gestures:

First, all optical flows estimated using the gradient approach within the extracted head region are taken into account as values denoting head movement. Second: Using finite state automata, the outcomes of head motions are then employed for recognition .

Static hand gesture recognition's main goal is to classify the given hand gesture data, which is represented by various attributes, into a preset, finite number of gestures. The primary goal of this work is to investigate the usage of two feature extraction techniques, in particular, hand contour and complex moments, to address the problem of hand gesture detection by highlighting the key benefits and drawbacks of each technique. An artificial neural network is created utilising the back-propagation learning technique for classification.

Three steps are taken with the hand gesture image: pre-processing, feature extraction, and classification. To prepare the hand gesture image for the feature extraction stage, certain techniques are used in the pr-processing stage to separate the hand gesture from its context. The hand contour is a factor that is employed in the very first strategy to address the scaling and translation problems. Finding the Inverse Discrete Fourier Transform allows for the reconstruction of the complex moment's algorithm (IDFT). This method uses an affine transformation at a specific angle to make input motions from different angles roughly equal to input gestures made at a 0 degree platform. As a result, the suggested approach can be regarded as a successful one for multi-angle gesture detection. The system's performance can be deemed adequate and usable.

To make the interaction more effective and dependable, a vision-based system to control different mouse actions, like left and right clicking, is presented. In this study, a vision-based interface for controlling a computer mouse with 2D hand movements is described. Hand movements rely on a colour detecting technology based on cameras. This technique primarily focuses on using a web camera to create a virtual HCI device in a practical way. Each input image's centroid is located. The centroid is also moved by hand motion, making this the fundamental sensor for changing the cursor on a computer screen.



III. MODELING AND ANALYSIS

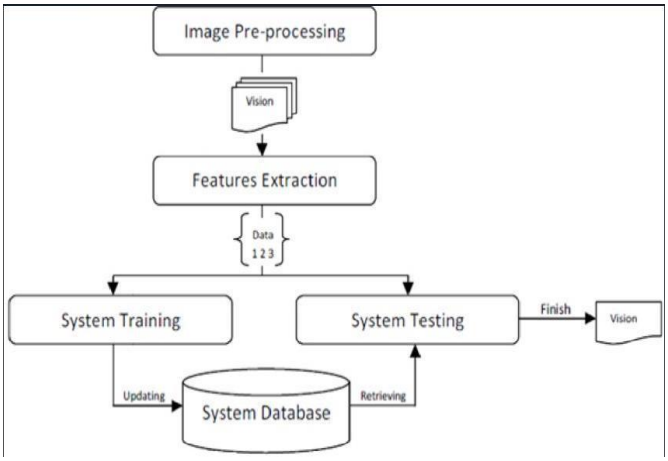
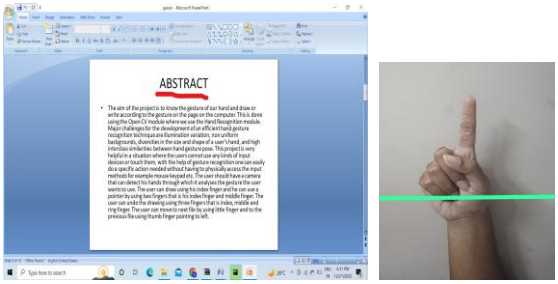
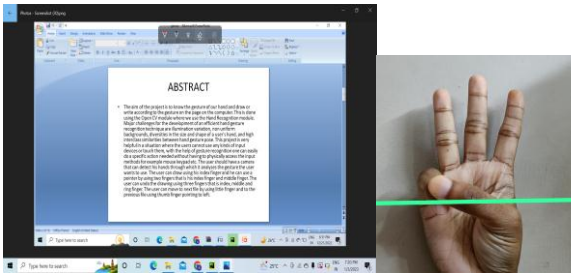


Figure1: Model Block Diagram.

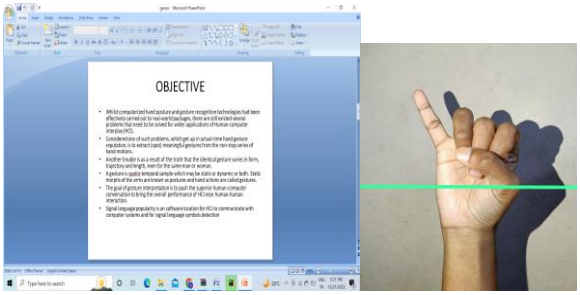
IV. RESULTS AND DISCUSSION

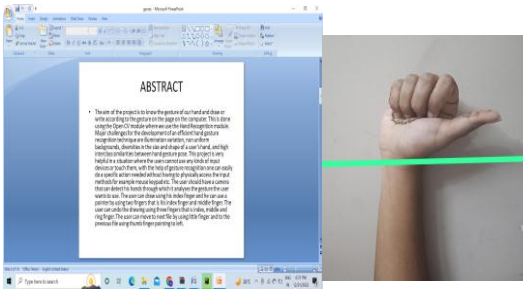


INDEX FINGER USED TO DRAW

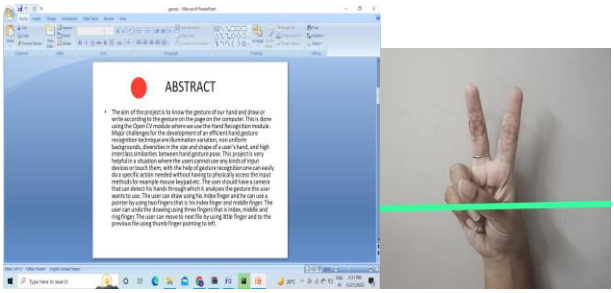


3 FINGERS ARE USED TO UNDO





LITTLE FINGER IS USED TO MOVE NEXT SLIDE **THUMB IS USED TO MOVE PREVIOUS SLIDE**



INDEX FINGER AND MIDDLE FINGER ARE USED AS A POINTER

V. CONCLUSION

• Gesture recognition algorithm is relatively robust and accurate.

• Convolution can be slow, so there is tradeoff between speed and accuracy.

• In the future, we will investigate other methods of extracting feature vectors, without performing expensive convolution operations.

ACKNOWLEDGEMENTS

We would like to express our special gratitude to our Guide Dr.SN Chandra Shekar and Co ordinator Dr.T.Rama Swamy who gave us a golden opportunity to do a wonderful project on this topic. It makes us to do a lot of research and learnt new things. We are really thankful to that.In addition to that , we would also thank my friends who helped us a lot in finalizing this project within the limited time frame.

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