IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

GESTURE CONTROL SYSTEM

[1]Aditya Fukate, [2]Elton Lobo, [3]Esha Manhas, [4]Piyush Fand, [5]Shreyas Fulsaundar, [6]Prasanna Fuse

[1]Student, [2]Student, [3]Student, [4]Student, [5]Student, [6]Student,
[1]Vishwakarma Institute of Technology, Pune, India

Abstract : The communication through subscribe language is a successful way of communication for speech and hail- bloodied humans. This paper checks recent hand gesture recognition systems that have gained attention due to their numerous operations and effective mortal- computer commerce. Crucial issues and challenges in hand gesture recognition are presented, along with review styles of recent posture and gesture recognition systems. The paper summarizes exploration results on hand gesture styles, databases, and the comparison of gesture recognition phases. Eventually, the advantages and downsides of the bandied systems are explained

IndexTerms - Opencv, Mediapipe, Hand Recognition, Gesture Recognition, Image Manipulation.

INTRODUCTION

The essential thing of erecting a gesture recognition system is to produce a natural human- computer commerce, and the honored gestures can be used to control robots or convey meaningful information. Gestures can be stationary(postures or certain stations), which bear lower computational complexity, or dynamic(sequences of acts), which are more complex but suitable for real- time surroundings. Several styles have been suggested to gain the information necessary for the recognition of gesture systems. Tackle bias similar as data glove bias and color labels are used in some styles fluently prize each detail of gesture features. Some styles use skin color to member the hand and other important features. This system is considered to be simple, natural and less precious than the forenamed styles.

To produce a real- time hand shadowing device using MediaPipe and OpenCV that can control a media player for eyeless and deaf people, you can follow these general way:

1. **Install the required libraries and software**: Firstly, you need to install MediaPipe and OpenCV libraries in your system, which can be done through pip or other package managers. You also need to install a media player like VLC, which can be controlled using keyboard shortcuts.
2. **Set up the webcam**: Connect your webcam to your computer and check if it is working properly. You can use the OpenCV library to access the video stream from the webcam.
3. **Detect and track hand movements**: Use the MediaPipe library to detect and track hand movements in real-time. MediaPipe provides pre-trained machine learning models that can detect the hand's position, orientation, and finger movements.
4. **Convert hand movements to media player commands**: Based on the hand movements, you can convert them into specific media player commands. For example, hand gestures can be used to play, pause, rewind, or fast-forward the media player.
5. **Integrate with media player**: Use the keyboard module in Python to simulate the media player keyboard shortcuts. You can then control the media player by sending keyboard shortcuts to it from your code.
6. **Test and optimize**: Test your hand tracking device and fine-tune it for better performance. You can also optimize the code for faster processing and better accuracy.

RESEARCH METHODOLOGY

Architecture

Mediapipe uses an ML channel that includes two models running inclusively:

• Palm sensor processes the input image and detect by orientating a bounding box of hand.

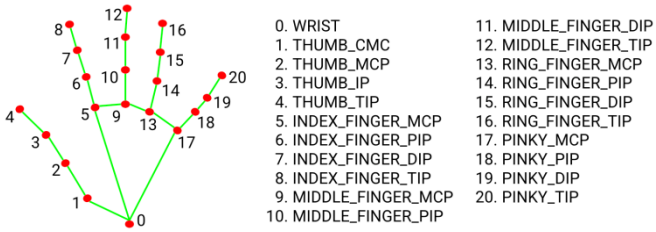
• Hand corner model that works on the cropped hand bounding box handed by the win sensor and returns high dedication2.5 D milestones.

Offering as it should be cropped pictures of palm tree landmark models significantly reduces the want for records augmentation (e.g. Rotation, translation, and scaling) and permits the community to attention most of its efforts on pinpoint region accuracy. .

Hand Landmark Model

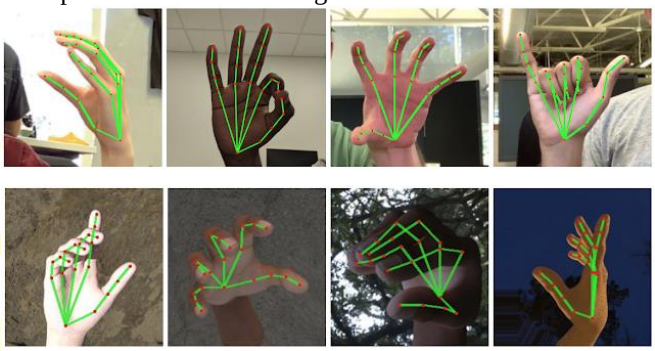
After running win discovery on the complete image, the successional hand corner model uses retrogression to perform micro localization of 21 match2.5 D milestones within the detected region of the hand.

1) 21 hand landmarks consisting of x, y, and relative depth.
2) A hand flag indicating the probability of hand presence in the input image.
3) A binary classification of handedness, e.g. left or right hand.



Algorithm

An appropriate algorithm can be derived using the 21 landmarks generated from the landmark model. For example, calculate the distance between two points using a simple distance formula to get the distance between different points, i.e. different locations



Application

After each gesture a function can be used to return specific commands specified for each gesture. Command for thumbs up can be set to play/pause and more like them.

RESULTS AND DISCUSSION

As we know that world is modernizing with a tremendous speed in terms of science and technology. Here we are trying to take Human Computer Interaction (HCL) one step closer. We are created **'Real Time Hand Tracking Device'** by implementing OpenCv and MediaPipe Library developed by Google. Our main structured domain is to help Disabled blind, paralyzed people to use and control the system as efficiently as other human beings does, just by their Hand Gestures. In the process of recognition image is first captured from RGB camera. It is important to note that this system evaluate only real-world images. The Palm detector provides the boundary to the palm i.e. BOUNDING BOX. And the Landmark from the Mediapipe predicts the Skelton of the palm and plots the point, which is the key aspect of the Hand Recognition. Our whole system is based on the distance between the points. Hundreds of images are being captured, processed and evaluated at every second, the point of time at which the condition is satisfied the task is performed. Let's take an example if we want to open an Music Player in Laptop/PC then we will put an condition if the distance between the points on the tip of thumb and index finger is less than 'x' units then open Music Player. As soon as the condition is satisfied the Music Player will be opened. So, this the applicational use of our 'Hand Recognition System'. Currently, OpenCv and MediaPipe are in Developing stages but can bring fatal changes in future once it is developed.

Acknowledgment

We would like to appreciate the authors of "Hand Gesture Recognition: a literature review" research paper for their significant contributions to the field. This research paper provides an in-depth analysis and information of hand detection methods and offers valuable insights into the challenges and potential solutions to the problem. We are grateful for the paper and its valuable contributions to the research community.

We would like to thank Prof Chandrashekhar. M. Mahajan for providing us with assistance in research.

CONCLUSION

In conclusion, We've explored Mediapipe and OpenCV's hand gesture recognition technology, discovering its potential for innovative human-computer interaction. These tools enable the creation of advanced gesture recognition systems for various applications, such as gaming and sign language interpretation. Combining machine learning with computer vision improves the accuracy and naturalness of the user interface, making it more accessible for all. We predict that this technology will play a critical role in shaping future technology.

REFERENCES

[1] **Hand Gesture Recognition : A Literature Review by Rafiqul Zaman Khan and Noor Adnan Ibraheem, Department of Computer Science, A.M.U. Aligarh, India**

[2] **MediaPipe Hands: On-device Real-time Hand Tracking by Fan Zhang, Valentin Bazarevsky, Andrey Vakunov, Andrei Tkachenka, George Sung, Chuo-Ling Chang, Matthias Grundmann, Google Research, USA**