Project ID: P-13

Category of Project: Software

PROJECT TITLE: ML based Windows Controlling using Hand Gestures

1. OBJECTIVES:

1) To design and implement an efficient and accurate hand gesture recognition algorithm for real-time applications.
2) To develop a user-friendly and intuitive hand gesture control system that allows seamless interaction.
3) Develop a system that can accurately recognize a variety of hand gestures with a high degree of precision.

2. DESCRIPTION:

-Introduction:

This project introduces an AI virtual mouse system utilizing hand gestures and computer vision for mouse functions. Gesture recognition systems, replacing traditional communication methods, are categorized based on technology and applications. While many solutions exist, webcam-based approaches are in the minority compared to sensor-based ones. Challenges include background interference and hand range constraints. The Virtual Mouse program aims to replace hardware mice, simplifying computer use and aiding users with motor impairments. Gesture recognition finds extensive applications in various fields, emphasizing its significance in human-computer interaction research.

-Methodology:

The real-time virtual mouse system utilizes webcam frames processed through OpenCV to detect hand gestures. It converts fingertip coordinates to control the mouse within the computer window, discerning gestures through MediaPipe. Mouse functions are executed based on finger positions, enabling actions such as cursor movement, left and right clicks, volume control, and drag-and-drop operations. Additionally, a custom hand gesture recognition model was developed using a proprietary dataset comprising six distinct gestures. This dataset, carefully curated to address overfitting issues, consists of 3000 images for testing, 2000 for training, and 500 for validation, ensuring accurate and reliable Windows control.

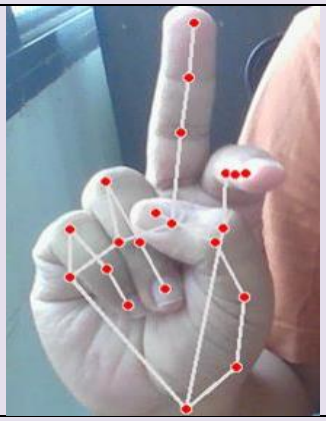
-Application:

In presentations and education, it enhances engagement by enabling navigation and interaction with multimedia content. Gaming experiences are revolutionized with gesture-based controls for virtual environments, enhancing immersion in VR and AR gaming. Healthcare utilizes hand gesture recognition for rehabilitation exercises and assistive devices, promoting faster recovery. Smart home automation integrates gesture recognition for intuitive control of appliances, lighting, and entertainment systems, enhancing accessibility and convenience.

3. RESULT:

This project highlights the potential of deep learning for hand gesture recognition in HCI, achieving an 89.50% accuracy in real-world testing. It underscores the importance of ongoing development to overcome challenges and optimize performance across various hand gestures, ensuring a more intuitive and user-friendly HCI system based on gesture recognition.

4. PHOTOGRAPH:

Photograph of project along with students

5. WORKING PROJECT YouTube LINK:

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