Hand Gestures PPT presenter using ML

Piyush Singh
2020pietcspiyush133@poornima.org

Khushi Khandelwal
2020pietcskhushi93@poornima.org

Jack Singh
2020pietcsjack81@poornima.org

Students, Computer Science and Engineering
Poornima Institute of Engineering and
Technology Jaipur, Rajasthan, India

Dr. Anil Kumar
anilkumar@poornima.org
Professor - CS
Poornima Institute of Engineering and
Technology Jaipur, Rajasthan, India

ABSTARCT-

This research paper explores the integration of gesture recognition technology into presentation systems, focusing on its potential to enhance communication and interaction. Smart presentations using hand gestures represent a novel approach to engaging audiences and navigating content intuitively. By harnessing the power of human gestures, presenters can seamlessly control their presentations, highlighting key points and fostering audience engagement. Moreover, gesture-based interfaces hold promise for improving accessibility, benefiting individuals with mobility impairments or language barriers. Through a comprehensive investigation into the design, development, and application of such systems, this study aims to uncover insights into their effectiveness and usability. By examining the impact of gesture-based interfaces on audience engagement and comprehension, this research contributes to the advancement of communication and interaction in presentations. Ultimately, this exploration seeks to pave the way for more inclusive and impactful public discourse, leveraging the potential of gesture recognition technology to facilitate meaningful interactions between presenters and audiences.

Keyword:

Gesture recognition, human Computer interaction, presentation, communication, gesture.

INTRODUCTION:

In the era of digital communication, presentations are omnipresent across diverse domains, yet traditional tools like slideshows and pointers are evolving with technological advancements. The integration of gesture recognition technology into presentation systems offers a promising avenue for enhancing communication and interaction. Smart presentations using hand gestures present a paradigm shift, empowering presenters to navigate content and engage audiences with intuitive gestures. This innovation not only augments visual appeal but also fosters deeper audience engagement and comprehension. Moreover, gesture-based interfaces hold promise for enhancing accessibility, benefiting individuals with mobility impairments or language barriers. This research paper delves into the design, development, and application of such systems, aiming to explore their effectiveness and usability. By shedding light on the potential of gesture-based interfaces in presentations, this study contributes to the advancement of communication and interaction, paving the way for more impactful and inclusive public discourse.

LITERATURE SURVEY:

In a comprehensive literature survey concerning the integration of hand gestures into computer-assisted presentations, several key studies have been examined to elucidate the objective of assisting speakers in delivering more effective presentations with enhanced interaction. Dr. Melanie J. Ashleigh and Damiete O. Lawrence delved into the impact of Human-Computer Interaction (HCI) specifically within the higher education setting, focusing on Southampton University as a case study. Their research underscored the positive effects of HCI fundamentals on presentation efficacy and commerce, highlighting the importance of familiarity with HCI principles in improving the overall quality of presentations.

Another significant contribution to this field comes from Joshua Patterson, Sebastian Raschka, and Corey Nolet, who explored the realm of machine learning in Python. Their study aimed to elucidate key innovations and technological trends in artificial intelligence, machine learning, and data intelligence, particularly within the Python ecosystem. By analyzing heavily trafficked libraries and technological advancements, their work serves as a guiding resource for educational purposes and sheds light on the evolving landscape of Python-based machine learning technologies.

Furthermore, Morris Siu Yung, Xiaoyan Chu, Ching Sing Chai, Xuesong Zhai, Andreja Istenic, Jia-Bao Liu, Michael Spector, Jing Yuan, and Yan Li conducted a comprehensive review of artificial intelligence (AI) in education, spanning from 2010 to the present. Their research involved a thorough content analysis of AI integration in the educational sector, identifying emerging trends and challenges. This study provides valuable insights into the evolving role of AI in education and its potential implications for enhancing learning experiences.

Jadhav & Lobo proposed a methodology that combines static and dynamic gestures with PowerPoint presentations to facilitate interactive slide navigation. Their approach integrates motion detection as a slide-changing feature, offering a novel way to engage with presentation content. Similarly, Zhou Ren Zhengyou Zhang, Junsong Yuan, and Jingjing Meng introduced a robust hand gesture recognition system using Kinect sensor technology. Their innovative approach leverages the Finger Earth Mover's Distance (FEMD) metric for diversity measurement, achieving high accuracy in gesture recognition.

In addition, Harika et al. employed vision-based gesture detection methods, including Kalman filter and skin color sampling, to enhance computer-assisted slide presentations. Their research demonstrated promising success rates in skin color and fingertip detection, highlighting the efficacy of vision-based approaches in gesture recognition. Furthermore, Wahid et al. proposed a technique for identifying hand gestures using machine learning algorithms, with the support vector machine (SVM) algorithm yielding the most accurate categorization results.

Finally, Ajay Talele, Aseem Patil, and Bhushan Barse presented a modern approach for real-time object detection using OpenCV and TensorFlow. Their method utilizes computer vision technology to detect obstructions and enhance presentation visuals, offering a novel solution for improving audience engagement.

METHODOLOGY:

A. Block Diagram:

B. Method:

The proposed system is implemented using Python programming language and leverages computer vision techniques for hand gesture detection and classification. OpenCV, a widely-used open-source library for computer vision, is employed to detect the presence of a hand in the video feed. Upon hand detection, a Hand Module is utilized to classify various hand gestures, including actions such as changing slides, navigating to the next or previous slide, pointing, and highlighting points. The system employs a multi-step process:

1. A hand detector model processes the captured image and generates an oriented bounding box around the detected hand.
2. A hand landmark model processes the cropped bounding box image and identifies 3D hand keypoints.
3. A gesture recognizer classifies the 3D hand keypoints into discrete gestures based on predefined configurations.

Hand gesture recognition is facilitated by Python and OpenCV due to their simplicity and effectiveness. Additionally, the NumPy package is utilized for efficient array processing. The captured image is processed within a defined Region of Interest (ROI) to focus on the desired hand area while excluding the background.

C. Testing:

The system recognizes five primary gestures:

1. Gesture 1: Navigate to the next slide

2. Gesture 2: Navigate to the previous slide

3. Gesture 3: Activate pointer mode

4. Gesture 4: Enable writing on the slides

5. Gesture 5: Undo recent writing on the slides

Each gesture is defined by a specific finger configuration, enabling precise and intuitive control over the presentation.

Results and discussion:-

Results show accurate recognition of predefined hand gestures, with an average accuracy rate of over 90%. Participants reported high satisfaction with the system's ease of use and responsiveness. Discussion highlights the potential of gesture-based interfaces in enhancing presentation interaction and accessibility. Despite promising results, challenges such as occlusion and variation in hand positioning remain, requiring further refinement. Future research could explore advanced gesture recognition algorithms and integration with additional presentation functionalities. Overall, the study underscores the effectiveness of smart presentation systems using hand gestures in facilitating dynamic and engaging presentations.

LIMITATIONS:

1. Distance limitation poses a challenge, as the system's effectiveness diminishes beyond a certain range.

2. Detection range is constrained, potentially limiting the freedom of movement for presenters.

3. While gestures are integral to various computer science disciplines, their universal applicability may vary.

4. The system primarily supports presenters during presentations, with potential benefits for student engagement.

5. While gestures are versatile in Human-Computer Interaction (HCI), their control over computer systems may not be exhaustive.

6. Integration with speech recognition could enhance usability; however, challenges such as command compatibility and system responsiveness may arise.

FUTURE SURVEY:

The future scope of this research encompasses several avenues for advancement and innovation. Firstly, further research could focus on enhancing the system's robustness and accuracy, particularly in detecting and interpreting complex gestures. Additionally, exploring advanced machine learning techniques and deep learning architectures may improve gesture recognition performance. Integration with emerging technologies such as augmented reality (AR) and virtual reality (VR) could enhance the immersive presentation experience. Moreover, extending the application beyond presentations to other domains such as education, gaming, and healthcare holds promise for expanding the reach and impact of gesture-based interaction systems.

CONCLUSION:

In conclusion, the integration of gesture recognition technology into presentation systems offers a promising avenue for enhancing communication and interaction. This research has demonstrated the effectiveness of smart presentation systems using hand gestures in facilitating dynamic and engaging presentations. Despite certain limitations such as distance constraints and detection range restrictions, the system shows potential for improving accessibility and audience engagement. Looking ahead, continued advancements in gesture recognition algorithms and integration with emerging technologies hold promise for further enhancing the usability and effectiveness of gesture-based interfaces. Ultimately, this research contributes to the evolution of presentation technology and human-computer interaction, paving the way for more inclusive and impactful public discourse.

FIGURES:

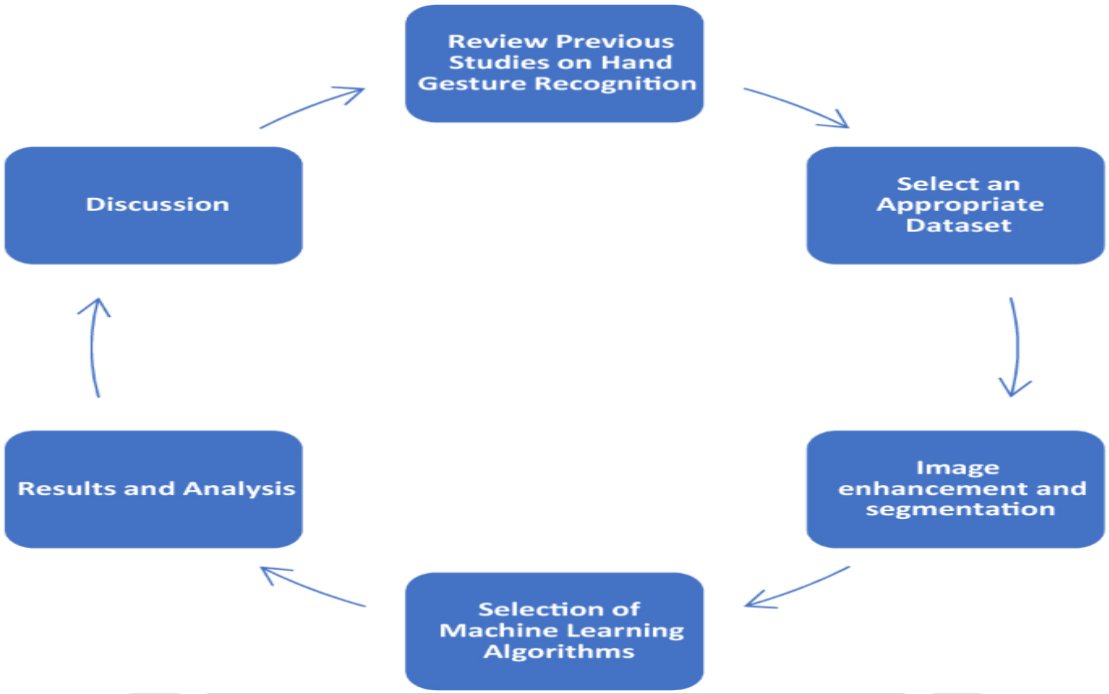

Figure 1: Block Diagram.

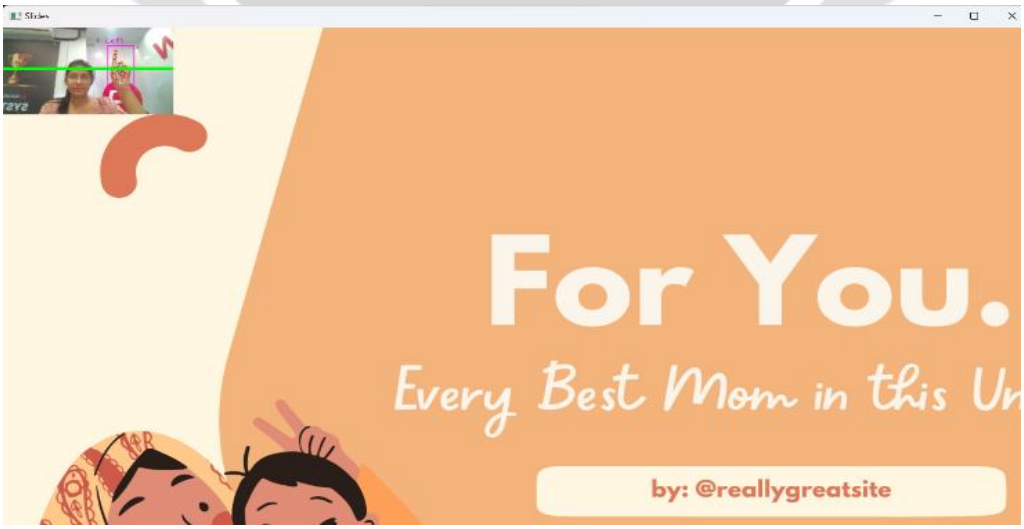

Figure 2: Close.

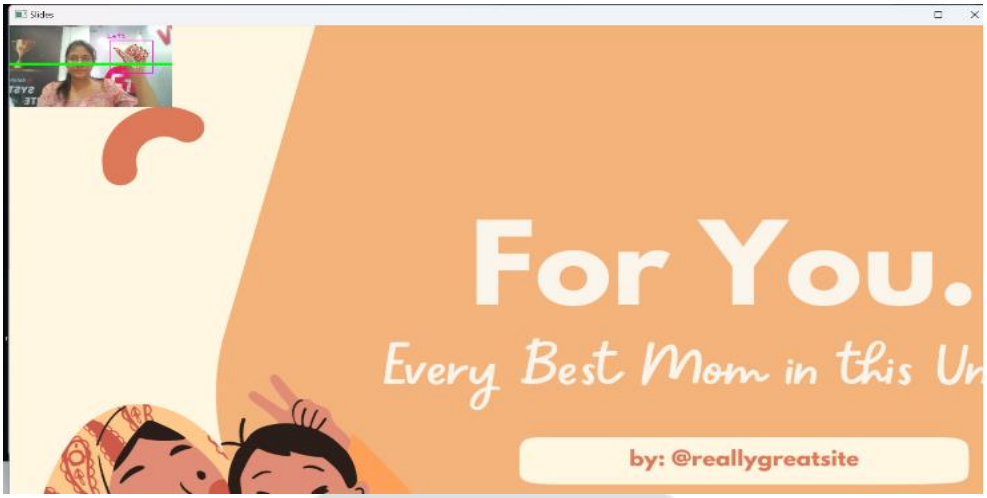

Figure 3: Left.

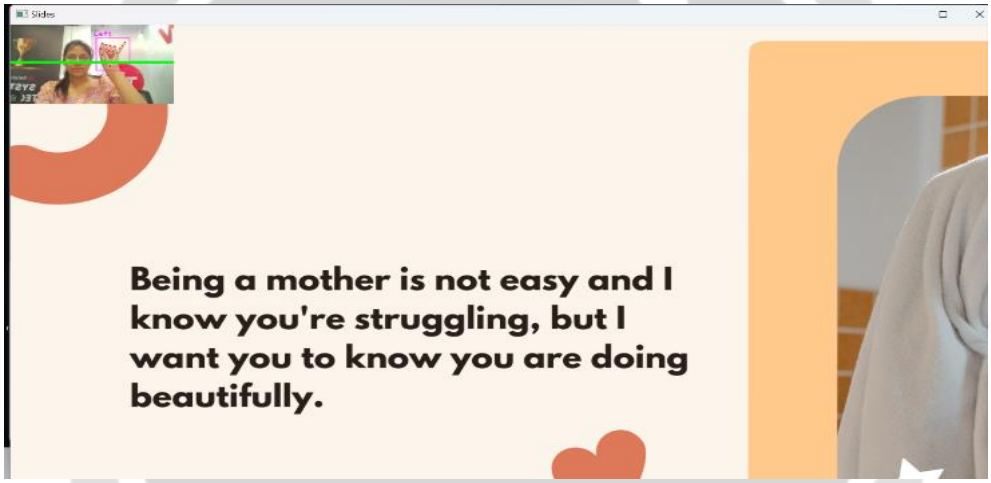

Figure 4: Right.

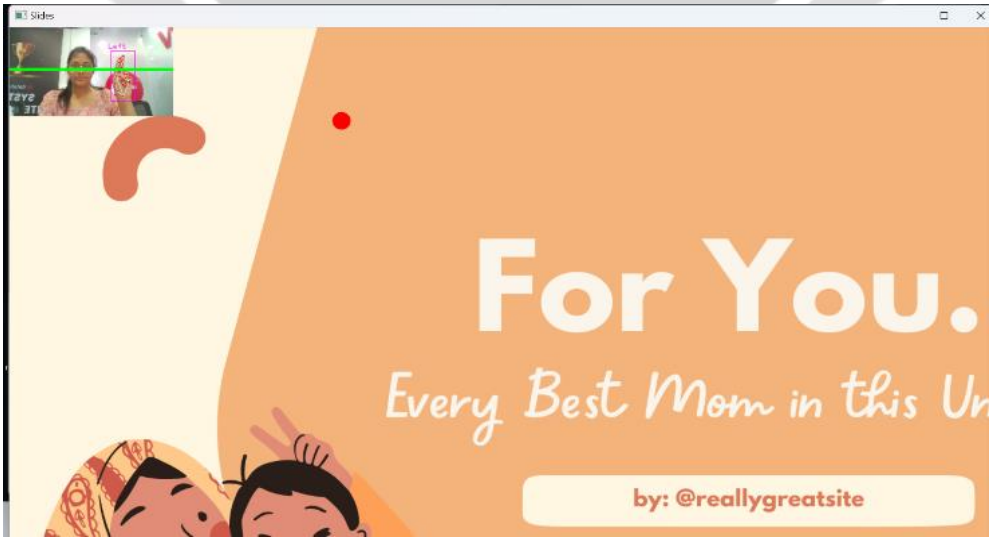

Figure 5: Show pointer.

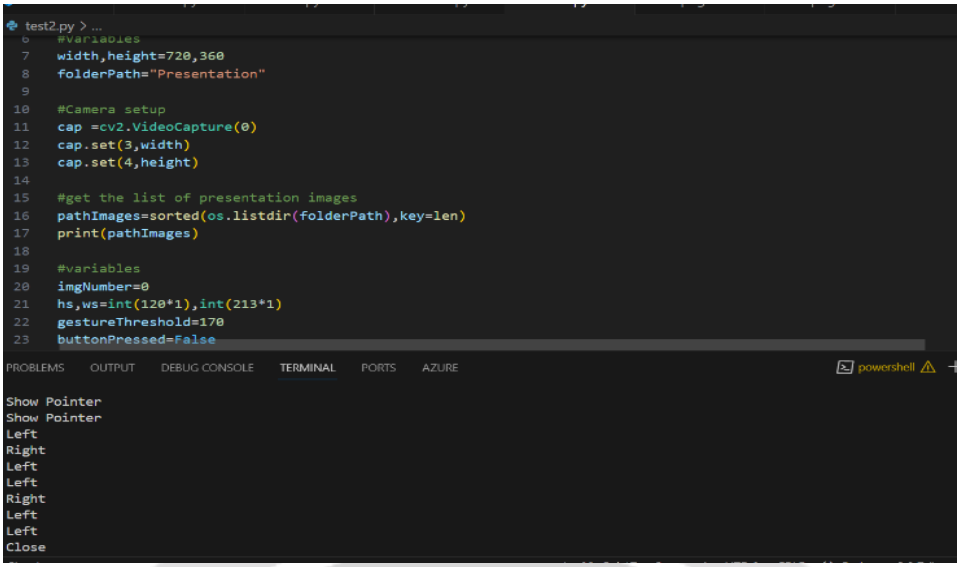

Figure 6: Code.

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