Artificial Intelligence -Based Human Activity Recognition For Surveillance

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ABSTRACT- ***This project develops an Artificial Intelligence-based human activity recognition system for enhanced surveillance. Using advanced AI and computer vision, the system automatically detects and identifies various human activities in real-time, enabling faster and more accurate monitoring compared to traditional methods that rely on manual observation or simple motion detection. By understanding specific actions, the system improves security by providing timely alerts and reducing the need for constant human supervision, making it a cost-effective and efficient solution. It offers a contactless and non-intrusive way to monitor environments, suitable for public spaces, workplaces, and homes. Unlike conventional surveillance systems that lack detailed activity recognition, this AI-driven approach enhances situational awareness and supports proactive responses to potential threats. Overall, the project delivers a smart, reliable, and practical solution to improve safety and automation in surveillance through intelligent human activity recognition.***

KEYWORDS: ***Artificial Intelligence, Human Activity Recognition, Surveillance, Computer, Vision, Real-time Monitoring, Security Automation***

INTRODUCTION

Surveillance systems aim to monitor and ensure safety in various environments by detecting and analyzing human activities. With advancements in Artificial Intelligence

and Computer Vision, human activity recognition has become an effective method for enhancing security. This project integrates AI-based human activity recognition to improve surveillance by accurately identifying and interpreting human actions in real-time.

The proposed system not only strengthens security but also adds intelligence by enabling proactive responses to suspicious or unusual activities, making surveillance more efficient and reliable.

LITERATURE SURVEY

Surveillance systems have gained significant attention in recent years due to rapid advancements in artificial intelligence and computer vision technologies. Such systems are designed to monitor environments by integrating sensing, communication, and intelligent analysis to enhance security, safety, and situational awareness. The core concept of this project revolves around human activity recognition and intelligent decision-making using real-time data collected from surveillance devices, enabling more effective and proactive security monitoring. In this project all are very useful.

RELATED WORK

Many researchers have contributed to advancing surveillance systems to improve security, safety, and automation. Early work in this field focused on basic monitoring systems that relied on manual observation or simple motion detection techniques. These systems often used wired communication and predefined rules, providing limited flexibility, intelligence, and real-time responsiveness in recognizing human activities.

EXISTING SYSTEM

Existing surveillance systems often rely on manual monitoring, simple motion detection, or basic alert mechanisms. Security measures typically lack intelligent verification of human activities and depend on fixed rules without real-time analysis. Continuous and automated monitoring is usually absent, causing potential security breaches to go unnoticed until manual review occurs. These traditional systems provide limited protection against unauthorized or suspicious behavior, lacking advanced intelligence and reliable automation to ensure effective surveillance and timely response.

PROPOSED SYSTEM

The proposed system uses AI-driven human activity recognition to enhance surveillance by continuously monitoring an area with cameras to detect and analyze human behaviors in real time. It identifies suspicious or unauthorized activities, enabling timely alerts and responses to potential security threats. This intelligent approach improves the effectiveness of surveillance systems by providing automated, contactless monitoring without relying on manual observation. The system leverages existing camera hardware, minimizing additional costs, and securely processes activity data to ensure reliable and accurate recognition for improved safety and security.

SYSTEM ARCHITECTURE

The architecture of the AI-driven human activity recognition system includes cameras for real-time monitoring, an activity recognition module, a behavior database, an alert control unit, and an overall surveillance management system. The cameras capture live video streams, which are processed by the activity recognition module to detect and classify human activities. The recognized activities are compared with stored behavior patterns in the database. Based on the analysis, the alert control unit determines whether to trigger security alerts or take other actions. This architecture provides secure, real-time, and intelligent surveillance by continuously monitoring and analyzing human activities to enhance safety and prevent unauthorized or suspicious behavior.

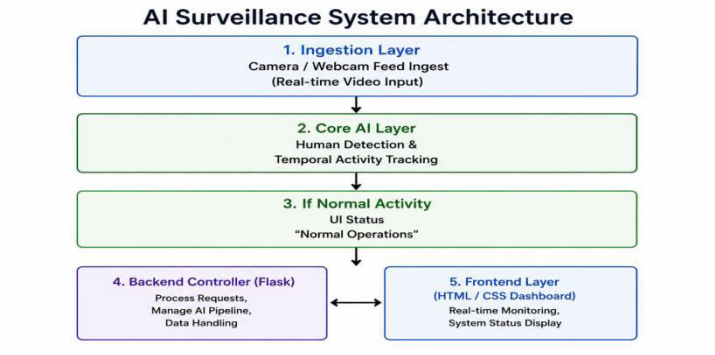

Fig 1: System Architecture

METHODLOGY DESCRIPTION

The methodology of the human activity recognition system is designed to provide intelligent surveillance through continuous monitoring, analysis, and response using advanced AI and computer vision technologies. The system follows a structured approach that includes data acquisition from cameras, communication of video data, processing and analysis of human activities, decision-making based on

recognized behaviors, and triggering appropriate security actions or alerts.

RESULTS AND DISCUSSION

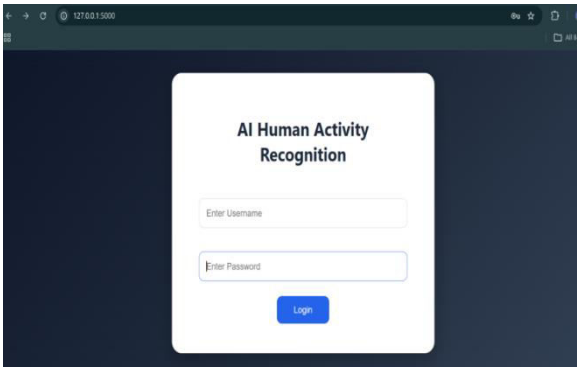

Fig2: Login Page of User

The login page provides a secure authentication interface where authorized users can enter their username and password to access the AI Human Activity Recognition System. It acts as the entry point to the application, ensuring secure access to the dashboard and preventing unauthorized use of the system.

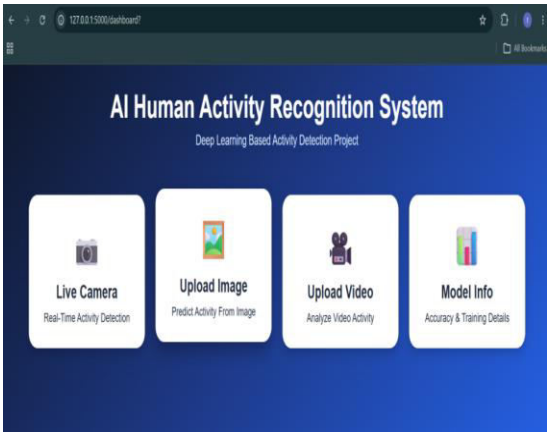

Fig3: Dash Board

The dashboard serves as the main interface of the AI Human Activity Recognition System, providing quick access to all core modules, including Live Camera Detection, Image Prediction, Video Prediction, and Model Information. It offers a simple and user-friendly layout that enables users to efficiently navigate the application and perform real-time human activity recognition tasks.

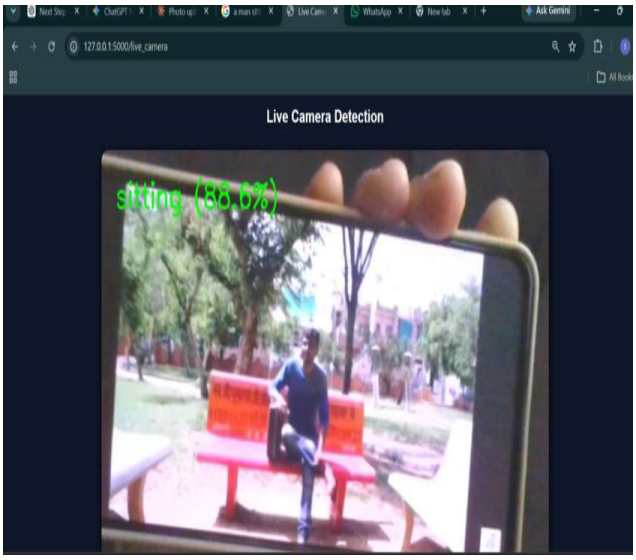

Fig4: Predicting the Image

The Live Camera Detection module captures real-time video from the connected camera and continuously analyzes each frame using the trained AI model to recognize human activities. The detected activity is displayed on the live video feed along with its confidence score, enabling accurate and real-time surveillance monitoring.

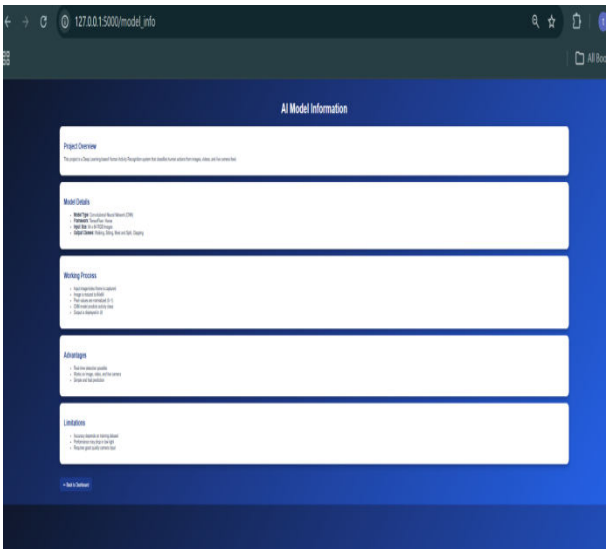

Fig5: Model Info

This project is a Deep Learning-based Human Activity Recognition system built using a Convolutional Neural Network (CNN) framework via TensorFlow/Keras. It processes 64 * 64 RGB images, videos, or live camera feeds to classify actions into Walking, Sitting, Meet and Split, and Clapping.

CONCLUSION

The AI-driven human activity recognition system enhances surveillance and security by accurately detecting and analyzing human behaviors in real time. By identifying suspicious or unauthorized activities and enabling timely responses, the system ensures a safer and more intelligent monitoring environment, improving overall protection and reliability.

FUTURE SCOPE

The proposed AI-based human activity recognition system can be further improved by incorporating advanced deep learning models to increase accuracy in diverse environments and complex activities. The system could integrate multi-modal sensors, such as audio or thermal cameras, to enhance detection reliability. Expanding support for cloud storage and mobile applications would enable remote monitoring and management. Integration with IoT devices like alarms and smart cameras can create a comprehensive surveillance network. Additionally, real-time alert mechanisms via SMS, mobile notifications, or automated responses can be enhanced to improve timely reaction to suspicious or unauthorized activities.

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