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Human Activity Recognition Using Deep Learning

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Abstract: Human Activity Recognition (HAR) focuses on the detection and classification of human movements using data collected from various sources, including video and wearable sensors. This paper presents a deep learning-based approach for identifying daily activities such as walking, running, sitting, and standing by utilizing accelerometer and gyroscope sensor data. HAR plays a vital role in domains like healthcare, smart environments, and fitness tracking. The study employs machine learning (ML) and deep learning (DL) models to address the challenges of data variability and real-time processing. As artificial intelligence and pervasive computing continue to evolve, HAR systems are becoming more precise, efficient, and scalable for practical applications.

I. INTRODUCTION

Human activity recognition plays a vital role in computer vision by focusing on identifying human actions in various contexts. Activities may vary in complexity, from simple gestures to intricate physical tasks. The use of artificial intelligence and deep learning has enabled the development of models that effectively interpret such behaviours using sensor and visual data. This studyintroduces a refined deep learning structure to achieve greateraccuracy with reduced computational costs. Applications of this system span surveillance, healthcare monitoring, and smart assistance solutions, reducing the reliance on manual observation**.**

II. LITERATURE SURVEY

1) Agarwal (1997): Investigated human motion interpretation using model-based strategies to monitor articulated body movements across time.
2) Wang (2003): Developed a combined framework using shape and motion features for real-time tracking and behaviour prediction.
3) Weinland (2011): Proposed a multi-view 3D action recognition method resilient to occlusions and viewpoint shifts using spatial-temporal descriptors.

III. EXISTING SYSTEM

Existing HAR systems commonly use convolutional neural networks (CNNs) and recurrent neural networks (RNNs) for identifying motion-related patterns in sensor data. These networks are capable of automatically extracting essential features that represent both spatial and temporal dynamics of human actions.

IV. PROPOSED SYSTEM

The model integrates CNNs for spatial data extraction with RNN-based structures like LSTM and GRU for handling temporal sequences. This hybrid system enhances the recognition accuracy and supports scenarios with limited labelled data by leveraging transfer learning techniques, making it suitable for real-time applications.

V. IMPLEMENTATION

The process begins with gathering and preparing data from video or sensor inputs. After preprocessing, deep learning networks are trained to identify meaningful patterns. The trained model can then detect and classify activities in various operational modes.

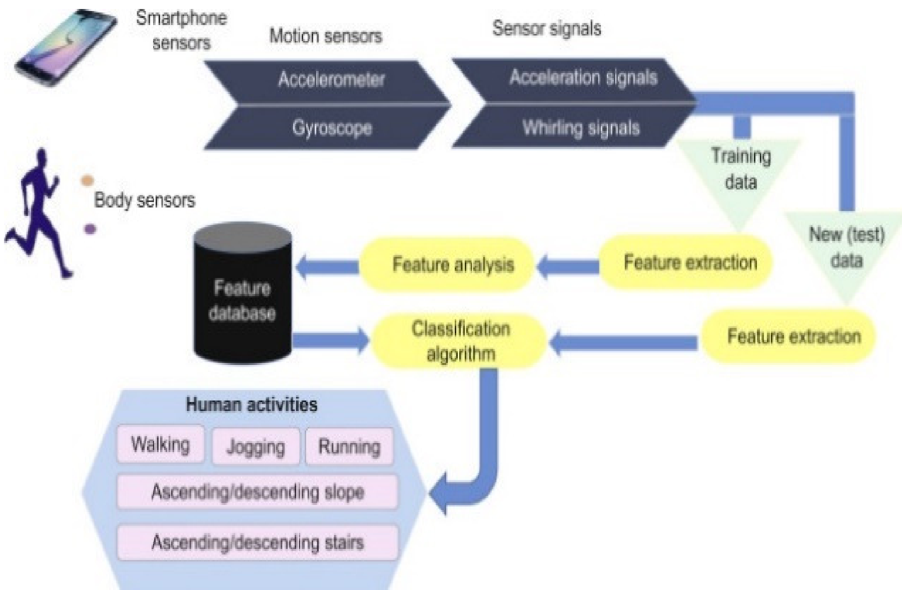
VI. MODULES

1) Video Preprocessing: Captures video and extracts keyframes.
2) Feature Extraction: Uses pretrained models for capturing spatial features.
3) Temporal Analysis: Aggregates motion over sequences.
4) Action Classification: Predicts activity types based on learned patterns.
5) Visualization & Output: Annotates video with predicted activities.

VII. ALGORITHMS

1) Frame Capture: Breaks video into frames.
2) Feature Learning: Applies pretrained neural networks.
3) Motion Analysis: Tracks movement over time.
4) Activity Labelling: Assigns activity names.
5) Output Display: Shows predictions on frames.

VIII. SYSTEM ARCHITECTURE



IX. DATAFLOW DIAGRAM

X. RESULT AND ANALYSIS

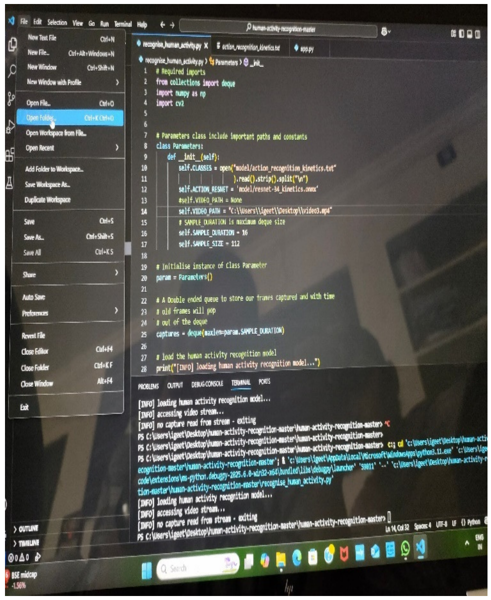


Fig 1: Open folder

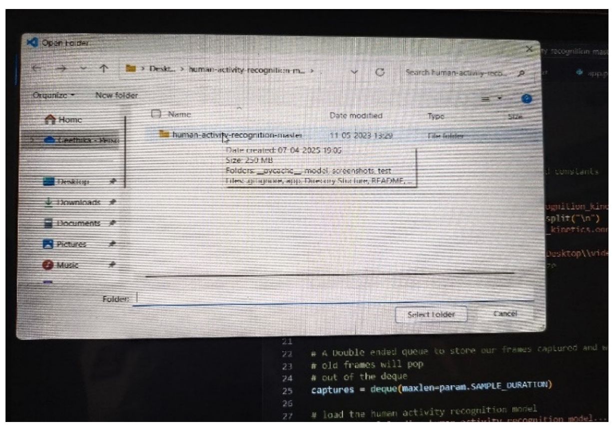


Fig 2: Select folder

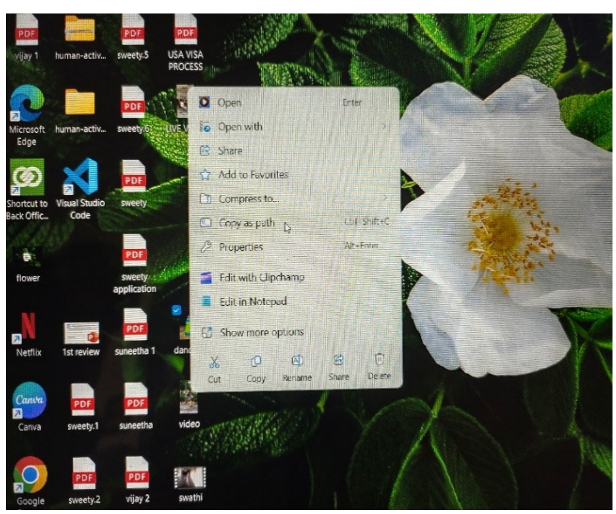


Fig 3: Copy Video path

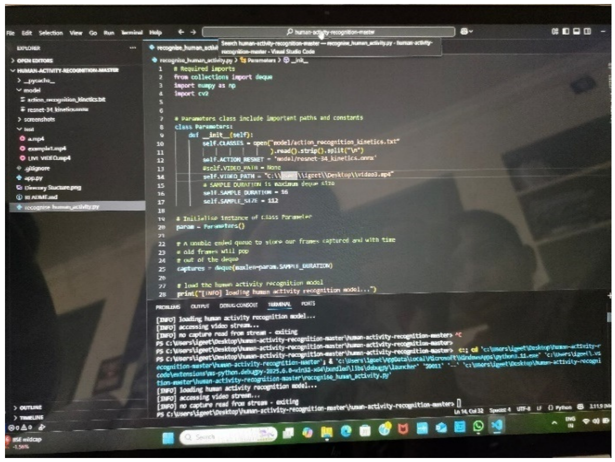


Fig 4: Paste the path

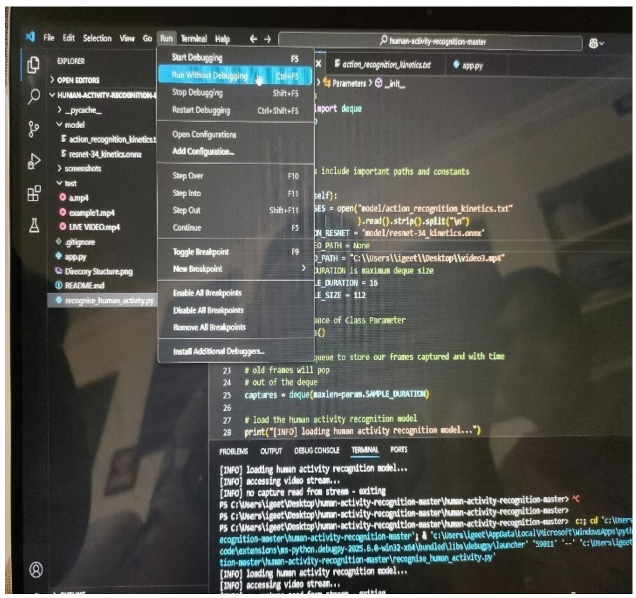


Fig 5: Run the code

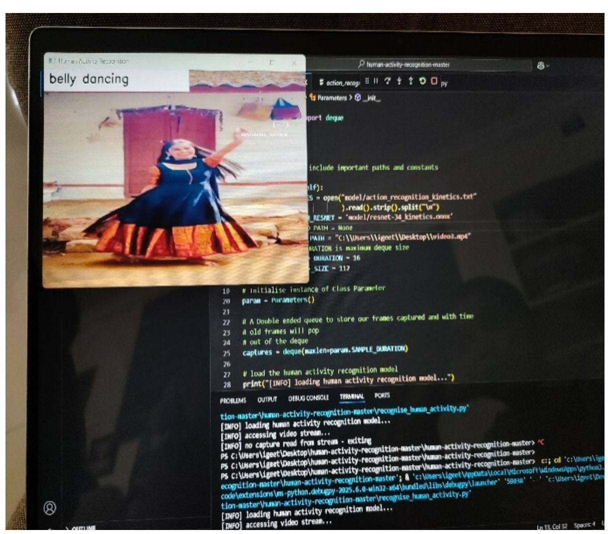


Fig 6: Identify activity

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XI. CONCLUSION

Deep learning technologies have transformed the HAR landscape by enabling accurate recognition of complex patterns. Despite current challenges such as computational requirements and data scarcity, the evolution of edge AI and improved algorithms will continue enhancing the adaptability and scope of these systems.

XII. FUTURE SCOPE

Future advancements may include more lightweight models optimized for deployment on edge devices, better real-time integration with IoT platforms, and user-personalized recognition models for enhanced reliability across different use cases.

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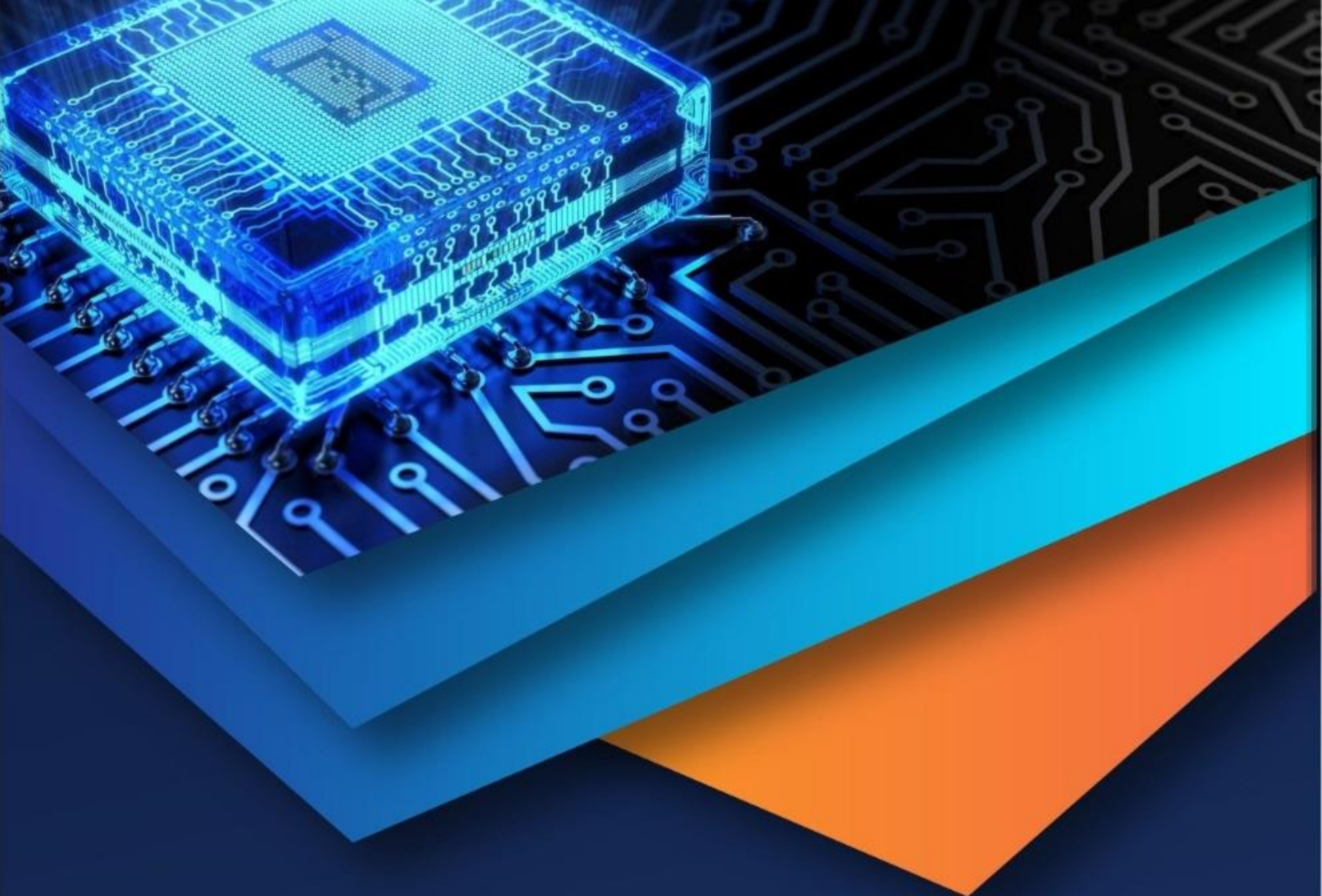

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