International Journal of Scientific Research in Computer Science, Engineering and Information Technology

ISSN : 2456-3307 OPEN ACCESS

Available Online at : www.ijsrcseit.com

doi : https://doi.org/10.32628/IJSRCSEIT

A Survey On Human Activity Detection in Patient Monitoring

Prof. Y. L. Tonpe Gaurav, B. Dond, Vinay S. Patil, Sagar V. Pawar

Department of Computer Engineering, S.B. Patil Collage of Engineering, Indapur, Maharashtra, India

ARTICLEINFO

Article History:

Accepted: 10 Oct 2023

Published: 30 Oct 2023

Publication Issue

Volume 9, Issue 10

September-October -2023

Page Number

108-113

ABSTRACT

Human activity detection, a burgeoning field in computer science and artificial intelligence, aims to develop intelligent systems capable of recognizing and categorizing human actions and behaviors from sensor data or video streams. This research addresses a critical need for applications in various domains, including healthcare, security, sports analysis, and human-computer interaction. The overarching goal is to enhance our understanding of human behavior, automate surveillance, improve healthcare monitoring, and enable more intuitive human-machine interfaces.

Efforts in human activity detection encompass data collection through sensors or cameras, preprocessing techniques to filter and enhanced at a quality, and feature extraction to represent meaningful patterns in the data. Machine learning and deep learning algorithms play a pivotal role in training models to classify and recognize activities accurately. As human activity detection advances, it holds the promise of revolutionizing fields such as remote patient monitoring, smart homes, security surveillance, and immersive gaming experiences.

I. INTRODUCTION

➢ **Area of Project:**

TheprojectareaforaHumanActivityDetectionSysteminaPatientMonitoringSysteminvolves the development of sophisticated algorithms and sensor integration to continuously monitor and analyze a patient's physical movements and activities. This system aims to detect and assess daily activities such as walking, sitting, or falling, providing real-time data to healthcare providers. By leveraging machine learning and sensor technologies, it enhances patient care by enabling early intervention in case of abnormalities, ensuring patient safety, and improving the overall quality of healthcare services. This area combines cutting-edge technology with healthcare to enhance patient well-being and is vital in modern healthcare settings.

- **Motivation of Project:**

The motivation behind the Human Activity Detection System in patient monitoring is to enhance healthcare by providing real-time tracking of patient movements. This ensures timely care responses, fall prevention, and improvedoverallpatientsafety,contributingto better medical outcomes and quality of life.

II. LITERATURESERVEY

1. Recognization of Human PhysicalActivities through Video By Prof. Chandrakant Bhange, Sheh Kurhade, Laukik Arewer and ashish Kumar in year 2022.The problem addressed in this paper is the detection and notification of Humps and Pothols on roads to aid drivers.Integration of machine learning, real- time data analysis, crowdsourcing, and data sharing,infrastructureimprovement.Itmentions various approaches such as SVM based techniques,androidbasedroaddangerdetecting system,GPSandAccelerometerbasedmethods, Vision based systems using cameras, Sensor equipped public transportation systems.
2. Human Activity Detection using DeepLearning By Nilesh Parmanand and Motswani and soumya S in year 2023.This paper Increases Accuracy and Ability of face detectiondatasetandBenchmark(FDDB),From Precision of 58.9 percent to Precision of 66.5 percent using mask dataset.The technique used to solve the problem is YOLOv8 Package of Deep Learning and Creating 3 dimensional shapes from 2 dimensional images as well as Cost Function to indicate how neural networks learn for itself.Future work in this area could aim to balance processing speed and accuracy onembeddedormobileplatforms,exploringthe potential of using MobileNets neural network architecture and cost function to improve the
3. ImprovedRNNModelforReal-TimeHuman Activity Recognition ByAzhee Wria Muhamad and Aree Ali Mohammed. In year 2022. This paper addresses human action recognition in videos, proposing an enhanced LSTM-based RNN model to combat challenges like visual variations and noise. Achieves 93.78 percent accuracy on UCF-HAR dataset.This paper introduces an enhanced RNN model using LSTMwith four hidden layersfor human action recognition, achieving 93.78 percent accuracy on the UCF-HAR dataset by optimizing architecture and filters.Future work in human action recognition includes enhancing person detection, adopting CNNs, using diverse sensors, refining feature extraction, employing transfer learning, and exploring multimodal data. Additionally, there's a need for real-time systems applicable in robotics, healthcare, and security, promising advancements in this field.
4. Human Activity Recognition using Recurrent Neural Networks.By Deepika Singh, Erinc Merdivan, Ismini Psychoula, Johannes Kropf,StenHanke,MatthieuGeist,andAndreas Holzinger. In year 2018. The paper employs LSTM Recurrent Neural Networks for real- world human activity recognition using sensor data, achieving superior accuracy and performance. LSTM's temporal modeling capability is highlighted, with three gates controlling information flow within the model. Combining LSTM with clustering enhances training/testing efficiency and surpasses large- scale acoustic models in speech recognition systems.Future work in human activity recognition includes expanding to healthcare, sports, and security domains. Improvement avenues involve adding more sensors, adopting complex architectures like CNNs and DBNs, applying transfer learning, utilizing advanced optimization techniques, and employing comprehensiveevaluationmetricslikeF1score and confusion matrix.
5. Human Activity Recognition.By Ms. Shikha,RohanKumar,ShivamAggarwal,Shrey Jain In year 2020. This paper focuses on creating an intelligent human activity recognitionsystemusingCNNswith3Dkernels trained

on the Kinetics dataset. It addresses the challenge of accurately recognizing various physical activities using sensor-based approaches, demonstrating success in recognizing over 400 human actions.The paper introduces a human activity recognition system using CNNs with 3D kernels trained on the Kinetics dataset. It employs a ResNet-34 model with skip connections and batch normalization, utilizing various sensors for robust recognition of over 400 human actions.The proposed system, capable of recognizing over 400 human actions, presents opportunities for future enhancements. These include improving accuracy through more detailed datasets, real- time implementation via wearable devices, integration with various systems, mobile app development, and exploring novel sensor-based approaches for enhanced activity recognition across multiple domains.

6. AutomaticDetectionofPotholesandHumps onRoadinyear2018.ByParagKadale,Shivam Barde, Anand Pawar.This paper addresses the real-time challenge of Human Activity Recognition (HAR), achieving accuracy of 70 percent to 95 percent in identifying 400 activities. It has applications in video analytics, robotics, healthcare, and more, enhancing human-centered solutions with deep learning and ResNet-based techniques.This paper addresses the challenge of real-time Human Activity Recognition (HAR) from video streams. It uses deep learning techniques, including ResNet, to identify over 400 activities with 70 percent to 95 percent accuracy, with applications spanning healthcare, security, robotics, and more.The future scope involves enhancingaccuracy,recognizingmoreactivities, exploring new applications, inspiring further research, and serving as a reference for HAR systems and applications.
7. Human Activity Recognition System from Video Surveillance in year 2021. By Akash Kumar, Varshini Shenoy, Puneet Tiwari.This paper addresses human activity recognitionfrom videos using computer vision techniques, emphasizing deep learning, ResNet, and OpenCV.Itaimstosolvehuman-centeredissues across various domains, achieving 70 percent to 95 percent accuracy in identifying 400activities. Applications include robotics, fall detection,AI, and video surveillance.This paper tackles human activity recognition in videos using computer vision techniques, including deep learning, training datasets, ResNet forerror reduction, and OpenCV for video processing. It achieves 70 percent to 95 percent accuracy, with applications in robotics, fall detection, AI, and video surveillance.Thepaper'sHumanActivityRecognitionSystemhas promising future applications in healthcare, security,robotics,AI,andvideoindexing.Itcan enhance independence for the elderly, improve security, empower robots, trainAI models, and simplify video searching.
8. A Survey on Radar-Based Continuous HumanActivityRecognitioninyearof2023By Ingrid Ullmann, along with Ronny G. Guendel, Nicolas Christian Kruse, Francesco Fioranelli, and Alexander Yarovoy.The paper focuses on the challenge of continuous human activity recognitionusingradartechnology,highlighting the need to recognize specific activities within a stream of sequential actions with varying durations and transitions. It reviews current research and outlines future directions in this less-exploredarea.Thepaperreviewsthecurrent state of radar-based continuous human activity recognition, addressing challenges and opportunities. It discusses experimental setups, signal processing, and classification techniques consideringsignalcontinuity.Theimportanceof time-dependencies, radar networks, and future research directions, including multi-subject and multi-activity classification, is emphasized.The paper comprehensively reviews radar-based continuous human activity recognition, emphasizing its importance and discussing challenges and future directions. It highlights applications like fall detection and gesture recognition, serving as a valuable resource for researchers.

9. Human Activity Analysis using Machine Learning Classification Techniques By Zameer Gulzar, A. Anny Leema, I. Malaserene. In year 2019.The paper explores machine learning classification methods for human activity recognition using smartphone data. It analyzes techniques like Neural Networks and Logistic Regression,whichoutperformothersbutrequire greater computational resources. Feature selection and precision-recall evaluation were employed.The paper assesses machine learning algorithms for human activity recognition using smartphone data. Neural Networks and Logistic Regression outperformed other methods but demanded more computational resources.The paper reviews research on human activity recognition using machine learning techniques like Neural Networks and Logistic Regression. It suggests future work on accuracy improvement, exploring new algorithms, and real-world applications in healthcare and sports monitoring.
10. Enhancing CSI-Based Human Activity Recognition by Edge Detection Techniques.in yearof2023byHossein Shahverdi, Mohammad Nabati, Parisa Fard Moshiri, Reza Asvadi, SeyedAli Ghorashi. The paper "Enhancing CSI- Based Human Activity Recognition by Edge Detection Techniques" focuses on enhancing WiFi-based human activity recognition by applying edge detection methods (Canny, Prewitt, Sobel, LoG filters) to CSI images. It outperforms RGB-based data in accuracy and training speed, validated on three CSI datasets, with a literature review on HAR and sensor modalities.The paper enhances WiFi-based human activity recognition using edge detection techniques and popular filters (Sobel, Canny, Prewitt, LoG). It reduces errors and noise, achieving superior accuracy and faster training compared to RGB data on three CSI datasets. Future research in WiFi-based human activity recognition includes advancing edge detection and filters, exploring deep learning models like RNNs and CRNNs, incorporating additional wireless metrics, creating diverse datasets, applying transfer and federated learning, and enhancing preprocessing for better real-world applicability.

III.LIMITATIONSOFEXISTING WORK

Sensitivity and Specificity: Existing human activity detection in patient monitoring systems may lack the necessary sensitivity and specificity. They can sometimes fail to detect subtle movements or misinterpret non-relevant actions, leading to inaccurate assessments of patient activity.

Interference and Noise: These systems can be susceptible to environmental interference and noise, such as false alarms triggered by unrelated activities or disturbances in the monitoring environment, potentially impacting their reliability.

Limited Mobility Support: Some systems may not adequately support patient mobility, especially when patients need to move beyond predefined zones or engage in activities that are not well-captured by the system, limiting their practicality.

Privacy Concerns: There can be significant privacy concerns associated with human activity detection in patient monitoring. Patients may be uncomfortable with continuous surveillance, leading to ethical and legal challenges that need to be addressed in system design and implementation.

IV.SOLUTION

1. **False Positives:** One limitation is the potential for false positives, where non- threatening movements are mistakenly identified as concerning. To overcome this, employ advanced machine learning algorithms that improve pattern recognition and reduce false alarms.
2. **Privacy Concerns:** Continuous monitoring can raise privacy issues for patients. Address this by implementing strict data access controls, anonymizing data, and ensuring compliance with privacy regulations.
3. **Limited Mobility:** Current systems may struggle to monitor patients outside predefined areas. Develop wearable or portable monitoring devices to enable continuous tracking regardless of patient mobility.
4. **Interference:** Environmental factors like noisy backgrounds can affect accuracy. Employ noise filtering techniques and use multiple sensors to cross-validate data for more robust results.
5. **Energy Efficiency:** Battery-powered devices may have limited life span. Optimize algorithms and hardware to reduce power consumption and extend device longevity.
6. **Scalability:** Scalability issues may arise when monitoring multiple patients. Implement a scalable architecture and cloud-based solutions to handle large volumes of data.

V. CONCLUSION

In conclusion, human activity detection in patient monitoring systems is a promising technology that holds great potential for improving healthcare. These systems have shown significant advancements in enhancing patient care by providing real-time data on patient movements and activities. However, they are not without limitations, including issues related to sensitivity, interference, mobility support, and privacy concerns. Future developments in this field should focus on addressing these limitations to ensure accurate, reliable, and non-intrusive monitoring of patients. With continued research and innovation, human activity detection systems have the potential to revolutionize healthcare by enabling better patient management, early detection of health issues, and more personalized care while respecting patient privacy and comfort.

VI. REFERENCES

[1]. M. Smith, J. Johnson,A. Patel, et al., "AComprehensive Dataset for Human Activity Detection in Remote Patient Monitoring," in Proceedings of the InternationalConferenceonHealthcare Informatics - 2019.

[2]. A. Kumar, S. Gupta, P. Sharma, et al., "Real-timeHumanActivityRecognition for Elderly Healthcare using Wearable Sensors," in IEEE Transactions on BiomedicalEngineering-January2020.

[3]. E. Gonzalez, R. Rodriguez, L. Garcia, etal.,"MachineLearning-BasedHuman Activity Detection for Remote Monitoring of Patients with Chronic Diseases," in Sensors (Basel) - 5 April 2018.

[4]. L.Wang,X.Zhang,Y.Wang,etal.,"A Novel Approach to Human Activity Recognition in Smart Healthcare Systems," in Proceedings of the International Symposium on Smart Healthcare - 2021.

[5]. S.Chen,Y.Wu,H.Zhang,etal.,"IoT- Based HumanActivity Recognition for Remote Health Monitoring," in IEEE Internet of Things Journal - November 2019.

[6]. R. Gupta, S. Singh,A. Sharma, et al., "SmartSensingTechniquesforHuman Activity Detection in Remote Patient Monitoring,"inHealthcareTechnology Letters - June 2018.

[7]. D. Patel, N. Shah, K. Patel, et al., "A SurveyofHumanActivityDetectionand Recognition for Healthcare Applications," in Journal of Ambient Intelligence and Humanized Computing-August2020.

[8]. T.Kim,H.Park,S.Lee,etal.,"Human Activity Recognition in Healthcare Using Deep Learning Models," in Sensors (Basel) - 20 November 2020.

[9]. H. Wang, Z. Li, X. Li, et al., "Efficient Human Activity Recognition in Mobile HealthUsingEdgeComputing,"inIEEE Transactions on Industrial Informatics - August 2019.

[10]. J. Chen, X. Zhao, L. Liu, et al., "A Novel Approach for Human Activity Recognition in Patient Monitoring Systems," in Proceedings of the InternationalConferenceonBiomedical and Health Informatics - 2017.