Chapter 12
AI-Powered Child Behavior Monitoring With Secure Parental Consent and Deep Learning-Based Suspicious Activity Recognition

Vinod Mahor
https://orcid.org/0000-0002-2187-6920
Maulana Azad National Institute of Technology, India

Jaytrilok Choudhary
Maulana Azad National Institute of Technology, India

Dhirendra Pratap Singh
Maulana Azad National Institute of Technology, India

ABSTRACT

Monitoring systems for child behavior that integrate intelligence with security and privacy protection must be prioritized amid the rising use of digital technology among children. The proposed framework offers an AI-based solution for child behavior monitoring by combining deep learning–based suspicious activity detection with security-certified parental consent mechanisms. The system employs a hybrid CNN-LSTM architecture, with a Convolutional Neural Network as its foundational component, to detect behavioral anomalies through complex spatiotemporal pattern analysis. The model achieves a training accuracy of 94.5% and a testing accuracy of

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93.2% on the Children's Social Behavior Dataset, demonstrating strong predictive and generalization performance. To ensure privacy and security, the framework incorporates three advanced mechanisms. Real-time child behavior surveillance uses the DLBSAR algorithm which applies deep learning principles. It begins with consent validation. Overall, the framework presents a scalable and ethical solution for next-generation child behavior monitoring.

1. INTRODUCTION

The increasing digital presence of children has introduced new challenges in ensuring their safety and well-being in both online and physical environments (Van Der Klis et al., 2022). With the proliferation of smart devices, social media interactions, and online gaming platforms, children are more exposed than ever to cyber threats, inappropriate content, and potential predatory behaviors (Garg et al., 2023). While conventional parental control mechanisms provide some level of supervision, they often lack intelligent adaptability, real-time monitoring, and privacy-preserving features. As a result, there is a growing demand for AI-powered solutions that can provide robust, context-aware child behavior monitoring while upholding ethical and privacy standards (T. Li et al., 2022).

Artificial Intelligence (AI) has emerged as a transformative force in behavioral monitoring, enabling automated recognition of patterns, anomalies, and potential risks in children's activities (Nguyen et al., 2025). By leveraging deep learning techniques, particularly hybrid Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) models, AI systems can effectively analyze spatiotemporal data to identify suspicious behaviors. However, the integration of AI in child behavior monitoring necessitates stringent privacy controls and secure parental consent mechanisms (Mahor, V et al., 2022). Ethical considerations must be addressed to prevent unauthorized surveillance, mitigate bias in decision-making, and ensure responsible AI deployment (Clarke et al., 2025).

This Chapter introduces an extensive framework for AI controlled child behaviors monitoring, and specifically, the combination of deep learning-based SAR (Suspicious Activity Recognition) with accepted privacy and consents protocol. The suggested system is aimed at making child safety better in places like homes, schools, and public places by, automatically identifying abnormal or danger causing behaviors with the help of high advanced AI models. Central to this framework is a hybrid CNN-LSTM architecture that is able to learn both spatial and temporal features of input from real time data. The CNN part extracts detailed spatial characteristics from image video frames, including postural deviations, expressions of face, and motion characteristics. These spatial attributes are then fed to the LSTM

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