Chapter 7
Enhancing Digital Child Safety Through a Transformer-Based Framework for Abnormal Behavior Detection

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ABSTRACT

The proliferation of digital platforms has significantly increased children's exposure to online threats, necessitating advanced and intelligent behavior monitoring systems. This study proposes a Transformer-based framework for abnormal behavior detection aimed at enhancing digital child safety. contextual relationships within sequential data, enabling superior detection of complex behavioral patterns. Leveraging attention mechanisms, the model integrates spatiotemporal features from video surveillance data to identify potential threats such as cyberbullying, online grooming, and inappropriate interactions. Trained on the ShanghaiTech Campus Dataset, the proposed model achieves a training accuracy of 96.4%, with a precision of 93.5% and recall of 94.5%, The system supports real-time analysis

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and proactive intervention across digital communication platforms and surveillance environments. This Transformer-based approach presents a promising direction for intelligent, context-aware child safety monitoring in an increasingly digital world

1. INTRODUCTION

Digital safety protection for children needs urgent attention in both virtual and physical spaces during today's technological era. The detection of abnormal behavior stands as a vital operation that identifies security threats while protecting people from dangerous incidents. A transformer-based framework designs an approach to boost digital child safety through precise identification of irregular behavioral patterns in surveillance video data. Through its transformer attention system the proposed method identifies complicated temporal along with spatial dependencies that result in accurate recognition of suspect dangerous actions. The research adds valeur to AI-based child protection research through its development of a solid dynamic system for real-time surveillance applications. Autism Spectrum Disorder (ASD) poses increasing diagnostic challenges due to its complex symptoms and rising prevalence. This chapter explores a deep learning-based facial analysis framework, addressing limitations in traditional diagnosis. It presents hybrid models integrating ViT with classifiers to enhance early ASD detection, structured through systematic experimentation and evaluation (Karthik et al., 2024). Early diagnosis of autism spectrum disorder (ASD) has become essential due to its rapid global increase as a complex neurodevelopmental condition. The chapter evaluates standard screening instruments while demonstrating how machine learning operates as both an advantage and solution. Research examines different machine learning detection methods for ASD alongside an evaluation of their accuracy performance in addition to system efficiency and practical usability (Sharma & Tanwar, 2020). The recognition of human activities stands essential for health supervision and creation of intelligent systems. The current methods demonstrate restricted functionality when handling feature extraction and real-time processing accuracy. This chapter develops a CNN-LSTM model with self-attention capabilities for smartphone sensor data analysis which leads to top-level performance results. Next sections describe the research work and methodology followed by experimental setups and obtained results (Khatun et al., 2022), and Sample frames from the Children's Abnormal Behavior Detection is shown in Fig.1.

Autism Spectrum Disorder (ASD) causes children to experience difficulties both in displaying emotions and interacting socially. The current chapter overcomes traditional assessment failure points using deep learning methods with cepstral speech features as input. The CNN-based model performs emotional pattern analysis between

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