

Crowd Behaviour Anomaly Identification Using AI

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Abstract: Crowd safety is a major concern in public environments such as shopping malls, railway stations, college campuses, and large event gatherings. Delayed identification of abnormal crowd behaviour—such as sudden running, panic movements, physical violence, or group conflicts—can escalate into serious accidents, injuries, and property damage. Conventional CCTV systems depend entirely on human operators to monitor multiple screens simultaneously, making the process slow, labour-intensive, and highly prone to human oversight. This highlights the urgent need for an automated, intelligent, and reliable monitoring solution.

This project introduces an AI-Driven Crowd Behaviour Anomaly Identification System that detects unusual and potentially harmful activities using advanced Pose Estimation and Deep Learning techniques. The system employs YOLOv8-Pose to accurately detect individuals and extract skeletal key points from each video frame. These motion-based features are further analyzed using a trained Temporal Autoencoder Model, which learns the patterns of normal human movement over time. Any deviation from these learned patterns results in a high reconstruction error, enabling the system to differentiate normal actions from suspicious or abnormal behaviour. Upon detecting an anomaly, the system highlights the affected region and automatically saves snapshot evidence for later review.

The proposed system is integrated into a user-friendly Streamlit dashboard, providing real-time frame visualization, alert notifications, and automatic snapshot saving for evidence. The design supports both uploaded videos and live monitoring setups. This project demonstrates an effective end-to-end pipeline for crowd behaviour analysis, emphasizing accuracy, real-time performance, and practical usability. Such an approach can significantly support smart surveillance systems in public places like malls, railway stations, stadiums, and metro hubs—ultimately enhancing safety and situational awareness through automated AI-based monitoring.

Keywords: Crowd Behaviour Analysis, Pose Estimation, Anomaly Detection, AI-Based Video Surveillance

