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AUTOMATED REAL-TIME DETECTION OF SUSPICIOUS BEHAVIOR IN PUBLIC TRANSPORT AREA

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ABSTRACT

Tracking individuals across multiple camera views presents challenges, but our proposed particle-based approach offers a promising solution. By independently initiating subject tracks in each camera view and establishing an initial state vector, we streamline the tracking process while maintaining accuracy. Video surveillance is a prominent area of research that includes recognition of human activities and categorization of them into usual, unusual or suspicious activities. This process involves prediction and evaluation stages. Prediction utilizes motion models to narrow down the search space for evaluating the presence of subjects in subsequent frames. Evaluation entails comparing predicted attributes like position, velocity, and appearance with observed data . In our project, we focus on identifying suspicious behavior by analyzing the entropy of particles generated based on human movements. This approach offers a refined understanding of behavior patterns.

Keywords —Suspicious behavior, particle based approach, tracking, input video**.**

I. INTRODUCTION

In India, there are millions of criminal actions reported in a year on average. It is more crucial than ever to identify and prevent crimes because of the surge in criminal activity in suburban and metropolitan regions. since it is practically impossible for people to constantly watch these security cameras. To ascertain whether the recorded activities are odd or suspicious, a workforce and their continuous attention are required. Artificial intelligence, image processing, and computer vision are being incorporated into video surveillance applications in the most recent research. Few publications give a thorough overview of the state of video surveillance systems today, despite significant advancements in the collection of datasets, techniques, and frameworks. The objective is to identify and classify suspicious behaviour using particle based entropy in order to identify or classify abnormalities from normal patterns.

II. RELATED WORK

Various methods, including Maximum Likelihood (ML), Maximum a Posteriori (MaP), Bayesian estimation, and data association, are employed to estimate the state of an object. ML estimates the state solely based on current observations, while MaP utilizes prior knowledge to compute the optimal state through optimization. Bayesian estimation retains both prior and posterior probability distributions, enhancing prediction accuracy for future distributions and sampling strategies. However, these methods may exhibit drawbacks such as decreased accuracy and unsuitability for tracking multiple objects.

K Kranthi Kumar et al proposed [1] an advanced deep learning algorithm for detecting suspicious activities in surveillance videos. It utilizes CNNs for feature extraction, and people tracking, and DDBNs for activity classification. This autonomous system enhances surveillance for public safety with real-time processing and a daily data capacity of 15-20 Gb. Future work includes optimizing for real-time detection and addressing challenges like explosives detection. Borse et al [2] reported methods for identifying suspicious activities in video surveillance: a semantic-based approach encompassing activity definition, background subtraction, object detection, tracking, and classification, and a Faster R-CNN deep learning algorithm for detecting gun crimes and

abandoned luggage. It compares their performance, noting strengths, weaknesses, and the impact of training data volume. Ghosh and Ghadge [3] introduced a novel method employing deep learning to detect suspicious activities in video surveillance. It addresses the growing demand for identifying abnormal behavior in video data, proposing a real-time surveillance system utilizing CNNs to classify activities and prevent crimes proactively. Karthi, and Kandaswamy [4] underscores the importance of preemptive detection in crowded areas to prevent suspicious incidents, highlighting the limitations of existing surveillance systems. Proposing a machine learning and deep learning-based approach, it advocates for early warning systems leveraging an Enhanced Convolutional Neural Network. Experimental Results demonstrate superior performance, showcasing the potential for enhancing pre-incident security measures. Haider Sharif, and Chabane Djeraba [5] introduced a novel method for detecting abnormal activities in video streams using entropy to measure spatiotemporal randomness. It emphasizes considering circular variance and interest point displacements for entropy calculation. Simulations and experiments validate the approach's effectiveness, suggesting it as a promising technique for identifying aberrations in video streams.

III. METHODOLOGY

The video taken is given as input. The video is first converted into frames and then preprocessing is done. The objects in the videos are tracked using particle. The particle entropy is calculated at each frame based on its position .This entropy change is used to find the suspicious behaviour.

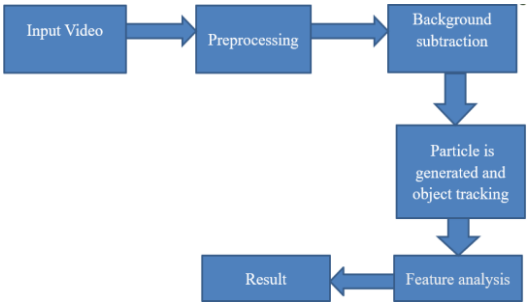

Fig1: Block diagram of suspicious behaviour detection

Working :

1. Preprocessing.
2. Particle generated
3. Classify the entropy
4. Analysis

Preprocessing: Videos with a lot of noise squander precious bits. Noise can be hidden via colour correcting. It is applied to raise the general quality of the image. In video preprocessing, deinterlacing, scaling, and colour space down sampling are the most often utilized operations. Because computer monitors are typically darker than the television sets you are used to, gamma correction is another crucial step in the preprocessing.

Particle generated: Probability is derived from a comparison of the mapped surface colour or texture (henceforth texture) with the image pixels and the correspondence between projected ellipses and foreground pixels Inversion sampling is used to carry out resampling, which selects samples using significance sampling. A general method for estimating characteristics of a certain distribution with samples solely drawn from other distributions instead of the distribution of interest is called importance sampling.

Classification : Following the generation of particles, their entropy is computed and compared either against a predetermined threshold or a trained value. This evaluation utilizes a Gaussian Mixture Model (GMM) classifier. Subsequently, based on the comparison results, the event is classified as either normal or abnormal.

Performance Analysis: Performance metrics such as sensitivity, specificity, error rate, and accuracy are employed to evaluate the classification results. These metrics are compared between our proposed approach and the existing system to gauge the effectiveness of our method in identifying suspicious events.

IV. RESULTS

Upon thorough comprehension and successful implementation of the project, it effectively identifying suspicious activities. The following are the suspicious activities identified from the uploaded footage.

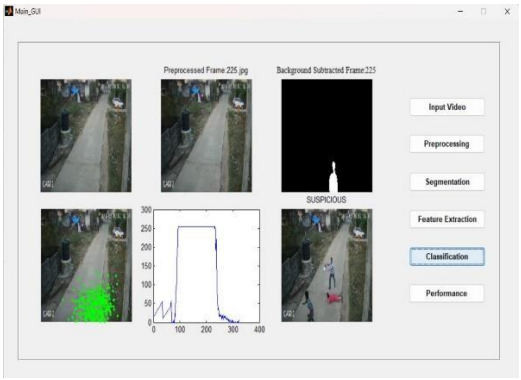

Fig 2 : suspicious activity detected output

V. CONCLUSION

The particle-based tracking method proposed in this study aids in simplifying multi-object tracking complexity, while the classifier accurately categorizes calculated entropy with high precision. These techniques collectively elevate the effectiveness of our proposed output. The simulation, executed in MATLAB, has been thoroughly validated to ensure reliability.

VI. FUTURE SCOPE

As part of future endeavours, our study suggests exploring alternative structures and conducting comparative analyses to enhance the speed of detections. Due to constraints in time and resources, our research was limited to the scope outlined in this report, leaving room for further investigation into enhancing real-time identification of suspicious activities. Additionally, incorporating additional features beyond surveillance footage could augment real-time detections.

VII. ACKNOWLEDGMENT

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