AN EFFICIENT ANOMALY DETECTION BASED ON OPTIMISED HYBRID MODEL AND MULTI RESOLUTION ATTENTION MECHANISM IN SURVEILLANCE VIDEO DATA

A THESIS

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ABSTRACT

Anomaly detection is the process of automatic recognition of abnormal activities in video sequences. The process of anomaly detection is a very challenging task in the multimedia community because of its complexity. This anomaly detection is mainly used for predicting a violent incident, criminal event or traffic accident in a video surveillance network. In recent decades, Deep Learning (DL) methods are used to train and learn large-scale datasets and provided excellent detection in various applications.

In recent times, the DL methods are used for several applications like medical, cybercrime, military, telecommunication etc. The DL methodology is also applied for anomaly detection to achieve effectiveness. The DL method has higher training and learning rate to observe any kind of pattern variation in video data. for anomaly detection, the temporal activity variation is effectively observed in a surveillance video using DL methods. But a few traditional models have attained an inaccuracy detection in anomalous and has taken more computational time. To achieve efficient anomaly detection with a greater performance, the proposed system has presented two various works in this thesis. The first work of this thesis proposed is a Cat-Mouse optimized hybrid DL method namely Convolutional Neural Network based Bidirectional Long Short-Term Memory (CNN-BiLSTM) for efficient anomaly detection. The CNN-BiLSTM method is used to provide temporal and spatial features in both forward and reverse directions which is a bidirectional LSTM. The cat-mouse optimization is used to fine tune the hyperparameter of CNN-BiLSTM model to acquire optimal accuracy for video anomaly detection with a minimum computational time. The

experimental results showed that an effective anomaly activity detection model in real-time video surveillance is achieved with superior performance.

Even then, the optimized CNN-BiLSTM model had issues in detecting accurate anomalies for multiple resolutions streaming data. To overcome this issue, the second phase of this work presents a Hybrid Attention Guided Network (HAGN) based on multiple resolution features for anomaly detection. To construct the HAGN model, the multi-resolution fusion approach is performed by aligning a spatial multi-resolution feature during fusion and also the features are distinguished after the fusion process. Additionally, the proposed HAGN model comprises of Multi-Granularity Operation (MGO) and Multi-Pool Feature Extraction (MPFE) modules for the expansion of feature map size. The MGO module is used to reduce the impact of irregular bounding boxes. Also, MPFE is used to extract various data types to enhance feature representation capability. The proposed HAGN-based multi-resolution model has achieved an exact anomaly detection in video surveillance than the existing methods.