**LITERATURE SURVEY**

**1)Title:** Evaluating the Use of Public Surveillance Cameras for Crime Control and Prevention- A Summary

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A growing number of cities are using surveillance cameras to reduce crime, but little research exists to determine whether they're worth the cost. With jurisdictions across the country tightening their belts, public safety resources are scarce and policymakers need to know which potential investments are likely to bear fruit. This research brief summarizes the Urban Institute's series documenting three cities use of public surveillance cameras and how they impacted crime in their neighborhoods.

# 2) Title: “STAN: Spatio-Temporal Adversarial Networks for Abnormal Event Detection,”

# AUTHORS: [Sangmin Lee](https://arxiv.org/search/cs?searchtype=author&query=Lee,+S), [Hak Gu Kim](https://arxiv.org/search/cs?searchtype=author&query=Kim,+H+G), [Yong Man Ro](https://arxiv.org/search/cs?searchtype=author&query=Ro,+Y+M)

# In this paper, we propose a novel abnormal event detection method with spatio-temporal adversarial networks (STAN). We devise a spatio-temporal generator which synthesizes an inter-frame by considering spatio-temporal characteristics with bidirectional ConvLSTM. A proposed spatio-temporal discriminator determines whether an input sequence is real-normal or not with 3D convolutional layers. These two networks are trained in an adversarial way to effectively encode spatio-temporal features of normal patterns. After the learning, the generator and the discriminator can be independently used as detectors, and deviations from the learned normal patterns are detected as abnormalities. Experimental results show that the proposed method achieved competitive performance compared to the state-of-the-art methods. Further, for the interpretation, we visualize the location of abnormal events detected by the proposed networks using a generator loss and discriminator gradients.

# 3) Title: Observe locally, infer globally: A space-time MRF for detecting abnormal activities with incremental updates

# AUTHORS : [Jaechul Kim](https://www.researchgate.net/profile/Jaechul-Kim-2?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19), [Kristen Grauman](https://www.researchgate.net/scientific-contributions/Kristen-Grauman-10599319?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19),

# We propose a space-time Markov random field (MRF) model to detect abnormal activities in video. The nodes in the MRF graph correspond to a grid of local regions in the video frames, and neighboring nodes in both space and time are associated with links. To learn normal patterns of activity at each local node, we capture the distribution of its typical optical flow with a mixture of probabilistic principal component analyzers. For any new optical flow patterns detected in incoming video clips, we use the learned model and MRF graph to compute a maximum a posteriori estimate of the degree of normality at each local node. Further, we show how to incrementally update the current model parameters as new video observations stream in, so that the model can efficiently adapt to visual context changes over a long period of time. Experimental results on surveillance videos show that our space-time MRF model robustly detects abnormal activities both in a local and global sense: not only does it accurately localize the atomic abnormal activities in a crowded video, but at the same time it captures the global-level abnormalities caused by irregular interactions between local activities.

# 4) Title: “A review of video surveillance systems

**AUTHORS:** Omar Elharrouss, Noor Almaadeed, Somaya Al-Maadeed

# Automated surveillance systems observe the environment utilizing cameras. The observed scenario is then analysed using motion detection, crowd behaviour, individual behaviour, interaction between individuals, crowds and their surrounding environment. These automatic systems accomplish multitude of tasks which include, detection, interpretation, understanding, recording and creating alarms based on the analysis. Till recent, studies have achieved enhanced monitoring performance along with avoiding possible human failures by manipulation of different features of these systems. This paper presents a comprehensive review of such video surveillance systems as well as the components used with them. The description of the architectures used is presented which follows the most required analyses in these systems. For the bigger picture and wholesome view of the system, existing surveillance systems were compared in terms of characteristics, advantages, and difficulties which are tabulated in this paper. Adding to this, future trends are discussed which charts a path into the upcoming research directions.

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# 5) Title: E2E-VSDL: End-to-end video surveillance-based deep learning model to detect and prevent criminal activities,”

# AUTHORS: A. A. Zaidi, B. Kulcsr, and H. Wymeersch

# Crime detection and their prediction is a fundamental process to reduce criminal activities before they actually happen. Moreover, the detection method is vital since can it potentially can save the victim's life, avoid all-time strain, and harm to the public/private property. In addition, it can be useful in predicting the possible terrorist activities. Crime detection using deep learning models is an attention-grabbing research area. Detecting and reducing the criminal activities is imperative to develop a peaceful society. Video surveillance automates the hazardous situations and enables a law enforcement system to take effective steps towards public safety. In this paper, an end-to-end deep learning model is proposed which is based on Bi-directional gated recurrent unit (BiGRU) and Convolutional neural network (CNN) to detect and prevent criminal activities. The CNN extracts the spatial features from video frames whereas temporal and local motion features are extracted by the BiGRU from multiple frames CNN extracted features. The focused bag is created to select those video frames which indicate certain actions. Moreover, ranked-based loss is used to effectively detect and classify the suspicious activities. For classification of activities, various machine learning classifiers are used. The proposed deep learning video surveillance technique is able to track human trails and detect criminal events. The CAVIAR dataset is used to examine the proposed technique for video surveillance-based crime detection with a performance accuracy of almost 98.86%. The alerts received from the proposed technique can also be examined, demonstrates that the practiced video surveillance cameras systems can effectively detect unusual and criminal activities. In addition, the proposed technique showed considerable performance accuracy and outscored the related state-of-the-art (SOTA)DL models including CNN-LSTM, CNN, HMM, and DBN and achieved 21.88% absolute improvement in crime detection accuracy..