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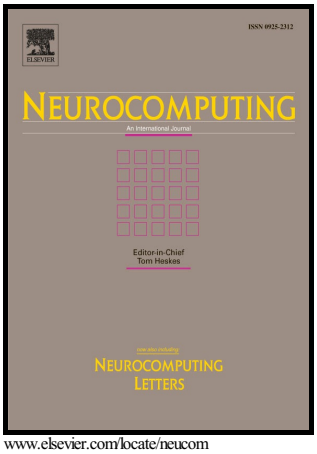

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Learning Deep Event Models for Crowd Anomaly Detection

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Abstract

Abnormal event detection in video surveillance is extremely important, especially for crowded scenes. In recent years, many algorithms have been proposed based on hand-crafted features. However, it still remains challenging to decide which kind of feature is suitable for a specific situation. In addition, it is hard and time-consuming to design an effective descriptor. In this paper, video events are automatically represented and modeled in unsupervised fashions. Specifically, appearance and motion features are simultaneously extracted using a PCANet from 3D gradients. In order to model event patterns, a deep *Gaussian mixture model* (GMM) is constructed with observed normal events. The deep GMM is a scalable deep generative model which stacks multiple GMM-layers on top of each other. As a result, the proposed method acquires competitive performance with relatively few parameters. In the testing phase, the likelihood is calculated to judge whether a video event is abnormal or not. In this paper, the proposed method is verified on two publicly available datasets and compared with state-of-the-art algorithms. Experimental results show that the deep model is effective for abnormal event detection in video surveillance.

Keywords: Deep neural network, PCANet, deep GMM, crowded scene, abnormal event detection, video surveillance.

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