A novel Approach for Suspicious Behavior Detection by Human Trajectory and Passageway in Surveillance Videos

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Abstract
There have been several contributions on human motion detection and action recognition over the past two decades. However detection of abnormal and suspicious behaviors in video surveillance is currently one of the most interesting studies for many research groups in computer vision and artificial intelligence. There are two well-known models to detect suspicious behaviors; misuse detection model and anomaly detection model [1, 2]. Misuse detection model is related to our common sense definition of suspicious behavior while anomaly detection model measures the difference between the defined normal behaviors and the current behavior [1]. In this paper we have employed the first model to classify human behaviors into normal, abnormal and suspicious types according to trajectory and spatiotemporal domains. In trajectory domain we define some abnormal trajectories which are not normal, like crinkle or loitering trajectories and then compare patterns of input trajectories for each person with those predefined abnormal trajectory. In the second domain some special regions on a scene which are not usual for walking are predefined. If a person stays there more than a threshold time, his behavior will be assumed as an abnormal one. Under some conditions abnormal type will be interpreted as a suspicious type. This is done by introducing a "normality level" which determines the commonality level of each behavior. If a behavior has a high "normality level" value, it is normal and lower values show abnormal and suspicious types of behavior. Employing both domains simultaneously provides high degree of accuracy in the proposed approach. In addition, introducing several level of abnormality according to the "normality level" parameter and having fuzzy approach led to differentiate between warning and alarm states. The above points plus on-line working of the system opposite of the complexity of its algorithms are positive points of our work.
Experimental results on the CAVIAR dataset show that our approach is able to detect abnormal and suspicious behaviors with an accuracy of at 90% in a real time process.

References

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