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Intelligence and Adaptive Global Algorithm Detection of Crowd Behavior

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ABSTRACT

The recognition and prediction of people's activities from videos are major concerns in the field of computer vision. The main objective of this article is to propose an adaptive global algorithm that analyzes human behavior from video. This problem is also called video content analysis or VCA. This analysis is performed in outdoor or indoor environments. The video scene can be depending on the number of people present, is characterized by the presence of only one person at a time in the video. We are interested in scenes containing a large number of people. This is called crowd scenes where we will address the problems of motion pattern extraction in crowd event detection. To achieve our goals, we propose an approach based on scheme analysis of a new adaptive architecture and hybrid technique detection movement. The first stage consists of acquiring the image from camera recordings. After several successive stages are applied, the active detection of movement by a hybrid technique, until classification by fuzzy logic is preformed, which is the last phase intervening in the process of detection of anomalies based on the increase in the speed of the reaction of safety services in order to carry out a precise analysis and detect events in real time. In order to provide the users with concrete results on the analysis of human behavior, result experimentation on datasets have validated our approaches, with very satisfying results compared to the other state-of-the-art approaches.

KEYWORDS

Adaptive Approach, Classification, Computer Vision, Event Detection, Event Recognition, Hybrid Technique, Motion Patterns

INTRODUCTION

Computer vision algorithms have played a vital role in video surveillance systems to detect surveillance events for public safety and security. Even so, a common demerit among these systems is their unfitness to handle diverse crowded scenes. In this paper, we have developed adaptive crowd behavior and motion detection algorithms using fuzzy logic. these solutions deal with some of the problems encountered in smart video games (Fradi, 2017; Chen, 2015; Li, 2015; Burghouts, 2011; Ullah, 2013; Wang, 2016).

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Intelligent video surveillance is a branch of computer vision. Expresses is itself a broad research axis, applied in different fields. Much research is already being done in this area. In particular, the recognition of activities and behavior in a video are subjects currently investigated by several researchers (Ko, 2008; Chebi, 2015; Chebi, 2016). In crowd scenes, three types of problems are commonly posed: (i) motion pattern extraction; (ii) event detection; And (iii) estimating flows. These problems are not new and have been addressed in several studies (Robert, 2000; Baumann, 2008; Morris, 2008; Chebi, 2015) (Chebi, 2016). Through this state of the art, we describe the descriptors or types of information exploited to deal with each of the three problems in order to arrive at a set of information characterizing these problems in a common way.

The approach suggested in this article given in Figure 1 differs from the existing approach (Ullah, 2013; Wang, 2016; Ko, 2008) by its dynamic of detecting anomalies in which it makes possible the detection of anomalies for both cases (the case of a group or a single person).

The approach total used in this research task for the detection of anomalies is characterized by its dynamic mechanism making it possible to detect in an automatic way the processes of anomalies "case of a normal and abnormal behavior." It can be divided into six stages to gather into three sublevels (Figure 1): the bottom level which estimates the optical flow, the intermediate level which constructs of the model magnitude and orientation and uses the techniques of image processing, and the semantic level which notifies of the operators.

Our work in this article deals with problem relates to the analysis of crowd behavior. We describe the proposals brought in the way following:

- Motion pattern extraction involves determining the most frequent movement patterns of the objects (persons or vehicles) present in the video. This is done by first estimating the movement or trajectories of objects in the scene. Then, we apply algorithms able to extract motive patterns. The analysis of motive patterns using individual trajectories is not suitable for crowd scenes because detection and follow-up of people are difficult. Optical flow is the most suitable and used method because it allows to estimate the movement of a person or a crowd regardless of the number of people in the scene. We distinguish two types of crowd scenes in this issue; structured and unstructured scenes. We also note that most approaches (Robert, 2000) (Baumann, 2008) (Morris, 2008) deal only with structured scenes where displacement in the scene is organized and uniform. However, unstructured scenes are often encountered in real situations. These scenes are more complex because there are several movement patterns in the same region;
- The detection of events in crowd videos has attracted the attention of many researchers in recent decades. Studies on the detection of crowd events (Baumann, 2008) are available to scientific community. In general, an event detection system uses the following steps (Fradi, 2017; Chen, 2015; Li, 2015; Burghouts, 2011; Ullah, 2013; Chebi, 2015; Chebi, 2016): (i) detecting each moving object, (ii) tracking detected objects, and (iii) analysis of their speed and trajectory to detect events or activities. Abnormal event detection approaches, although simpler to implement, do not give semantics to abnormal situations. Semantic event detection approaches can detect different types of events. However, they do not handle situations where two events happen at the same time in the scene. As some crowd event analysis approaches also estimate the crowd density (which is the case for (Utasi, 2009)) that allows us to estimate the number of people in an image, and as the work (Chebi, 2015; Chebi, 2016) which allows the detection of behavior in a local and global way in a crowd scene using hybrid techniques between DBSCAN and neural networks. This is part of a wider problem that is the estimation of flows. We present a state of the art of this problem in the following part;
- Numerous approaches to estimating flows by counting people have been proposed in the literature. The problem is often simplified by the use of a zenith camera (vertical) (Antic, 2009), a front camera (Zhao, 2009) or a multi-camera configuration (Danny, 2003). The approaches can be divided into five categories: (i) Methods based on motion trajectory analysis, (ii) Contour-based