

Survey on Intruder Detection from Surveillance Videos

Palagati Harish, K.Priya

Abstract—Surveillance cameras are the main source to detect malpractices, thefts, intruders in our daily life. These cameras records large volumes of data in video format. The data recorded by surveillance cameras are just stored and they are not processed. Several methods are introduced to track and extract the features from these videos to detect intruder. But, the detection will mismatch in crowded areas. Detection of human activity is complex in such areas. Semantic Content Mining (SCM) is proposed to extract the semantic content like objects and events from the video. This method is useful for the detection of human activity and his behavior. Construction of ontology provides spatial and temporal relations between different video frames. This provides the events or actions performed by intruders.

Keywords-Semantic content; Ontology; Human activity recognition; Spatial and Temporal Relations

I. INTRODUCTION

The rapid growth in using video data to detect malpractices done in public places leads to develop intelligent methods to process and extract the video content. Applications like Surveillance systems, sport events, criminal investigation systems and other systems need to process and model the video content or data present in it. The goal is to retrieve knowledge data from the large volumes of unprocessed video data in a meaningful manner.

The video contains three levels of content namely raw video data, low-level features and high-level features (Semantic Content). Raw video data contains some basic physical video units along with some video attributes like format, length, and frame rate. Low-level features are audio, text and features that are visible like texture, color distribution, shape, motion, etc. Semantic content in the sense meaningful content that contains high-level features like objects and events occurred in the video.

Detecting Intruder from large crowd is the crucial task in which the video content may contain huge noise like vehicles, trees, etc. Processing these videos to retrieve deals with great extent. Existing systems like Human activity detection from online video surveillance and detects single human activity from video sequence [1]. First, video contains sequence of frames and shots. Extracting the features from the video directly is a difficult task where as extracting the features from an image is easier. So, convert the video into sequence of images called shots in which extracting features is easier. Feature Extraction is the process which provides object tracking and object detection from the image. Tracking of object and detection from videos [2], [3] using background subtraction and noise reduction algorithms.

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After, extracting the features from the shots, an ontology should be constructed to find the relations between the extracted features. To find Spatial and Temporal relations use some rules like near, far, etc. Finally, semantic content should be extracted from the videos using these relations and ontology construction.

The paper is arranged as section1 is including introduction. The Related work is included in section 2.The existing system is describe in section 3. Proposed system in section 4 and conclusion in section 5.

II. RELATED WORK

Manya V. Afonso et al. (2014) [5] have developed a method using region matching for computing of trajectories automatically and velocity of multiple moving objects in video sequence. It is difficult to find moving trajectories in crowded regions. So, the proposed method reduces this using some estimated algorithms. One more method is proposed for automatic trajectory of object in moving fields. Victor Escorcia et al. (2013) [6] developed a method to capture dynamic nature of human interaction objects based on time factor. It provides the temporal relations between these human interaction objects to detect the human activity in the video sequence.

B. Karasulu et al. (2013) [2] proposed a method for detecting and tracking of moving object in videos. The methodology uses several sub processes like detecting and tracking features like color, shape, size, etc., After extracting features background subtraction is performed to reduce noise. Further a mean shift filtering process is used and finally optical flow is used for tracking the moving object.

Joo-heon Park et al. (2013) [4] have developed an algorithm for intruder detection based on the temporal and spatial relations along with the region of interest. The proposed process checks for the sequence of image frames by using spatial and temporal relations to detect the intruder. It also uses the Intruder flag to check with the previous or next frame for intruder detection.

Neelam V. Puri et al. (2012) [7] introduced a method for tracking of human object from the video recorded in surveillance cameras. It takes static background of the image and is processed through morphological operations to reduce the noise from the image. Later, by recognizing human object, it uses alarm to ring if any abnormal situation occurs in the process.

Kanchan Gaikwad et al. (2012) [1] developed human action recognition from videos by using Hidden Markov Models(HMM). Hidden markov model is used for recognition of human activity and these are compared with other models which gives good results.

A.R.Revathi et al. (2012) [8] presents various surveillance methods like object tracking, recognition of human activity and understanding the behavior of the human for the detection of intruder.

Helly Patel et al. (2011) [9] proposed a method for automation of surveillance cameras to trigger an alarm if any abnormal or unwanted condition happens. It converts video to frames and processes these frames for noise removal and extraction of human activity.

A. Vasanth Kumar et al. (2011) [10] developed Hidden Markov Models(HMM) for extracted video sequences which is converted to image sequences and further converted to triangular meshes for easier recognition of normal and abnormal conditions in the video.

III. EXISTING METHOD

Many tracking and detecting techniques are developed for detecting intruder from surveillance videos. Detecting the intruder using Hidden Markov Models, Genetic algorithms, noise removal techniques, background subtraction, Mean shift filtering, etc., provides only on static background. It only deals with less populated areas. Recognizing the human activity is complex in crowded regions and may mismatch the intruder. The proposed method overcomes this problem using ontology and semantic content extraction.

IV. PROPOSED METHOD

The proposed method provides extraction or tracking of objects in dynamic nature. To perform this, features are to be extracted from the video recorded by the surveillance systems. A feature extraction algorithm was proposed. Ontology should be constructed for the extracted features such that it provides relationships between the features extracted. A model called Semantic Content Mining(SCM) is proposed for extraction of semantic content which provides meaningful information about the extracted features. Spatial and Temporal relations are used for extraction of high-level features like classes and events.

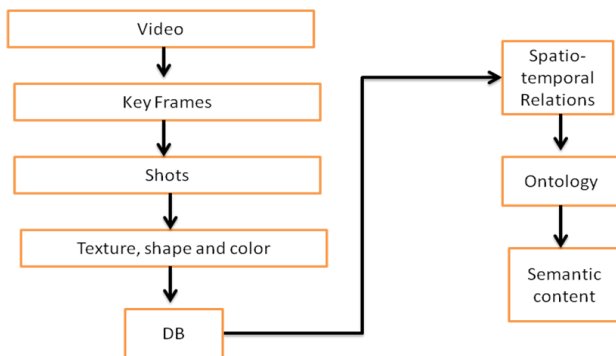


Fig: Proposed Block Diagram

The above figure is the proposed block diagram in which first a video is converted into sequence of key frames which are further divided into shots. From these shots using Region of Interest (ROI) features like texture, shape, color, objects, etc., are extracted. These extracted features of each shot are stored in a database which creates and checks for the spatial and temporal relations. Ontology construction provides and reduces the semantic gap between the features. Using ontology, semantic content is extracted for the detection of intruder.

V. CONCLUSION

The goal of this paper is to find the intruder or intrusion in the best way without any false-matching. This may be useful for surveillance areas. A software is used to convert video to sequence of key frames and further to shots. To detect the

intruder, ontology and semantic content with the general object tracking methods based on ROI is proposed. Semantic content extraction uses temporal and spatial relations to extract concepts from events.

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