

Abstract

Crowd management is an essential tasks to ensure the safety and smoothness of any events. Using the novel technologies including surveillance cameras, communication technics between security agents, the control of the crowd has become easier. But the sue of these technics still not perfectly effective. This paper presents an approach for managing the crowd at the entrance of event (festival, stadium,..) using surveillance cameras. Using cameras and some panel in each entrance, the crowd density is extracted and illustrated in each panel. So, before reaching any gate , the people can see the available and the not crowded gate to reach the target. The proposed technique help not just in smoothing the motion of the crowd but also minimize the crowidity and abnormal behaviors of the people.

Methods and Materials

In this work, we propose an automatic solution for managing the crowd. The proposed solution for managing the crowd in the entrance of the event target like stadiums, as illustrated in the Figure 1. As First step, the region of interest is extracted using heatmap generation form the video. Then the estimation of percentage of crowidity of this region is computed using a deep learning model. The DL model is trained on some dataset based on VGG16 architecture . The percentage of crowidity in the scene helps the people to see this percentage before reaching any gate.

Using surveillance cameras at each Gate, as well as a Panel for illustrating the percentage can be a best solution. Also, the night vision infrared camera can be used instead of day-vision cameras.



Figure 3. Deep density estimation Results

Introduction

Automated crowd analysis has been a topic of interest in computer vision and attracted much attention according to the growth of people gathering in several occasions including festivals, sport events, religious events as shown in Fig.1 [1]. However, the abnormal behaviors and the occlusions in the crowd make the analysis in the goal of managing an essential tasks [2]. Nowadays, with the development of monitoring technics the analysis and the management of crowded scenes became more easier and covering different aspects including crowd activity learning, crowd motion analysis, abnormal activity detection and recognition [3].

In order to analyze the crowd, many tasks are tackled in the estimation of the density of the crowd by counting the number of people in the scene [4]. Using deep neural networks, many researchers also attempt to recognize the people behaviors to detect if there are any abnormal activities.



Figure 1. Examples of mas gatherings

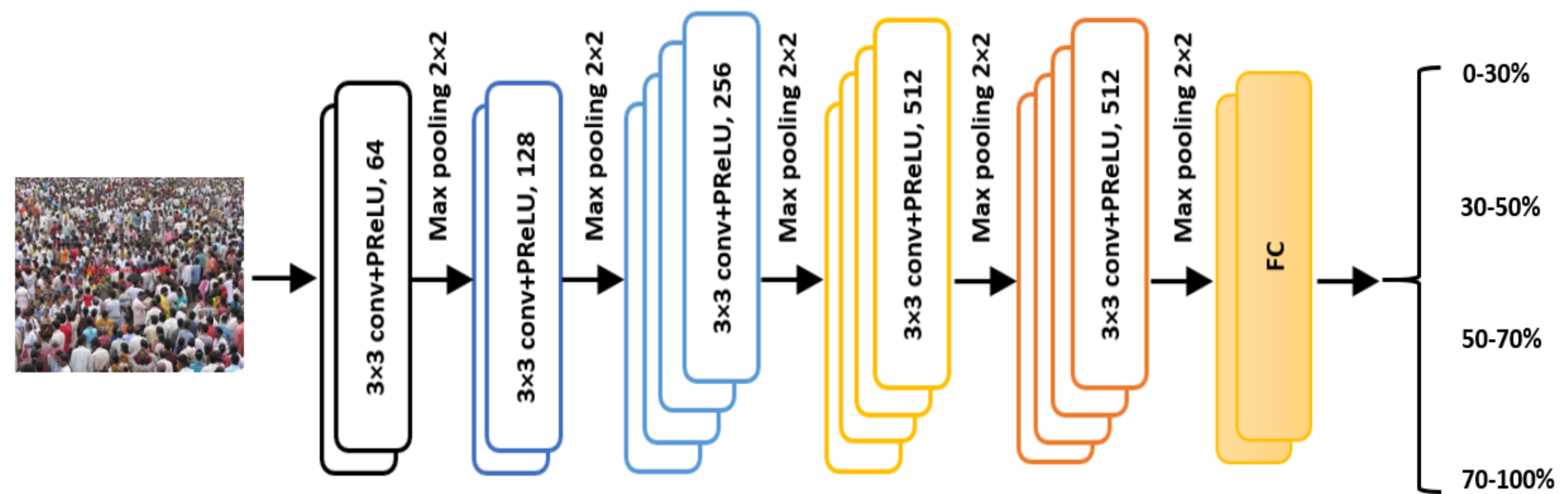
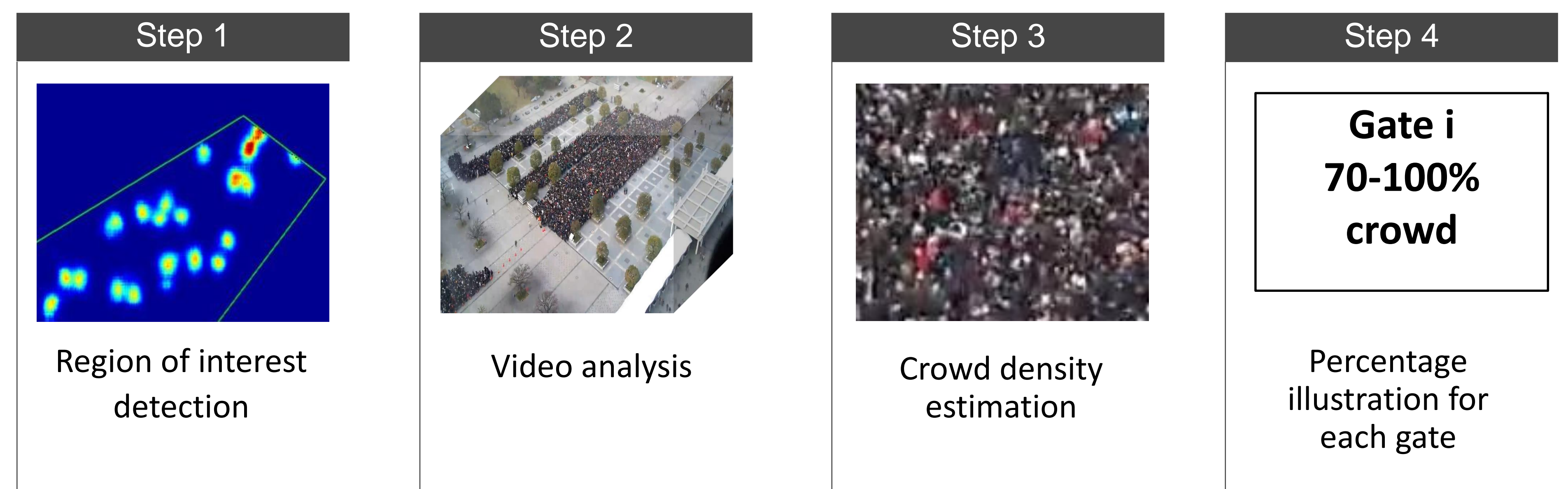


Figure 2. Deep density estimation model



Results

For training and testing the proposed approach the evaluations has been made on ShanghaiTech crowd dataset [5]. The performance rate are convincing and can be used in real time. The accuracy of crowd density estimation using VGG19 architecture reach 99% for all tested image.

Conclusion

- Crowd density estimation method for crowd management at event entrance.
- Percentage of crowidity at each gate that can allow the motion without problems.

Contact

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