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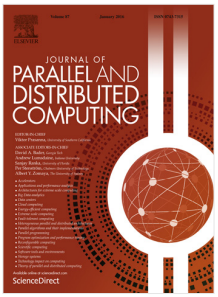

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Santosh Kumar, Deepanwita Datta, Sanjay Kumar Singh, Arun Kumar Sangaiah

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An Intelligent Decision Computing Paradigm for Crowd Monitoring in the Smart City

Santosh Kumar[1], Deepanwita Datta[2], Sanjay Kumar Singh[3], Arun Kumar Sangaiah[4]

[1, 2, 3]Department of Computer Science and Engineering, Indian Institute of Technology (Banaras Hindu University)
Varanasi-221005, India
[4]School of Computing Science and Engineering, VIT University, Vellore-632014, Tamil Nadu, India
[1]santosh.rs.cse12@iitbhu.ac.in, [2]ddatta.rs.cse13@iitbhu.ac.in, [3]sks.cse@iitbhu.ac.in, [4]arunkumarsangaiah@gmail.com

Abstract

The ever-expanding urbanization and the advent of smart cities need better crowd management and security surveillance systems. Advanced systems are required to improve and automate the crowd management system. The aim of the closed circuit television and visual monitoring systems using multiple cameras faces many challenges like illumination variance, occlusion and small spatial-temporal resolution, person in sleep, shadows, dynamic backgrounds, and noises. Therefore, the crowd monitoring, prevention of stampedes and crowd-related emergencies in the smart cities are major challenging problems. In this paper, we propose an intelligent decision computing based paradigm for crowd monitoring in the smart city. In the intelligent computing based framework, the optimization algorithm is applied to compute the feature of crowd motion and measure the correlation between agents based motion model and the crowd data using extended Kalman filtering approach and KL-divergence technique. The proposed framework measures the correlation measure based on extracted novel distinctive feature, and holistic feature of crowd data represent and to classify the crowd motion of individual. Our experimental results demonstrate that the proposed approach yields 96.20% average precision in classifying real-world highly dense crowd scenes.

Keywords: Crowd motion, Crowd monitoring, Computer vision, Smart city, SIFT, Agent Motion Model, K-NN, KL-divergence.

1. Introduction

Crowd management in the smart city is getting more proliferation due to its widespread of application and usage recently. Pedestrian crowd are the essential part of smart cities. To provide better solutions and services in the smart cities, crowd monitoring, planning, and crowd management are necessary [1]. Therefore, various mathematical simulations, theoretically based models, and efficient simulation tools as well as various intelligent support systems using computer vision approaches, pattern recognition and image processing for the crowd management plays a vital role in monitoring and tracking of crowd motion [2]. In the smart cities, different surveillance systems are deployed to monitor the various activities and control and monitor the traffic in the several crowds at several places, such as shopping mall, traffic signals, roads, railways, and airport platforms, etc. The control and monitoring of crowd are important task and major changeling problems in the smart cities recently throughout the world [3].