ABSTRACT

COSTA, Joelmir Ramos da. *Detection of anomalies in Crowd Videos Using Artificial Bacteria Colony*. 2017. 121f. Dissertação (Mestrado em Engenharia Eletrônica) – Faculdade de Engenharia, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, 2017.

In an increasingly populated world wherein large crowd are expected in public spaces on a daily basis, understanding and predicting human behavior within crowds is essential for maintaining the safety of individuals. Nowadays, with the steady increase in the number of surveillance cameras, distributed throughout the world, the analysis of human activity on a large scale has become possible. However, the volume of data to be analyzed and classified, in addition to the computational cost involved in the process, make the development of accurate real-time event detection systems a major challenge. In this dissertation, an event detection in crowd video system is developed that allows real-time applications. The proposed system in this work evaluates the performance of 3 methods for motion extraction between *frames*, develops an optimization algorithm inspired by bacterial colonies, aiming at quickly covering with artificial bacteria the regions of interest of the layers containing movement, and finally, it uses Kohonen neural networks to classify the behavioral patterns of bacteria colonies that emerge during the optimization. Based on the proposed method, we evaluated two video datasets which are commonly used about medium and high density of crowds: UMN and PETS 2009. We also evaluated a long surveillance video about of car traffic on a high speed avenue. All the simulations were performed on MATLAB ®. The performance of the motion extraction methods is evaluated according to the processing time per pair of frames. The performance of the algorithm CBA is measured by the processing time and the amount of initial bacteria and the classifier is compared to that of other video event detection state-of-the-art algorithms by the area under the ROC curve, presenting similar results but with lower computational cost and real-time application possibilities. The results of the experiments demonstrate the efficacy and efficiency of the proposed system.

Keywords: Optical Flow; Social Force Model; Absolute Difference Between Frames; Collective Intelligence; Optimization by Artificial Bacteria Colony Algorithm; Kohonen's Neural Network; Abnormalities Detection in Videos.