Abstract

Object detection is one of the challenging steps in video surveillance. The most popular and robust technique for object detection is background subtraction. It is always challenging to obtain better performance of background subtraction algorithm as it requires appropriate initial tuning of common parameters like number of components in Gaussian Mixture Model (GMM), threshold, learning rate and initial values. Traditional way of tuning is manual selection of parameters based on background scenario. It requires good understanding of background scene to the end user and iterative experimentation with manual setting leading to significantly time intensive and tedious tuning process. As initial tuning affects performance of background subtraction, it makes significant impact on usage of an algorithm and its selection based on current application. In this paper, simplified novel methodology of pixel’s history based parameter tuning is proposed. Method uses statistical features to approximate background situation and fuzzy logic approach to bound tuning criteria. Broadly, statistical features are extracted from pixel’s history and processed by Fuzzy Inference System (FIS). GMM parameters as FIS output are exclusively used for background subtraction. Algorithm evidently
demonstrates its effectiveness in parameter selection. The proficiency of proposed tuning system is also highlighted by comparison with manual and Particle Swarm Optimization (PSO) based method over diverse Wallflower Dataset.

References


Index Terms

Computer Science Fuzzy Systems

Keywords
Object Detection, Background Subtraction, Gaussian Mixture Model, Fuzzy Inference System.