学校编码：10384

学号：23020131153150

厦门大学

硕士学位论文

视频监控中道路交通事件发现技术研究

Research on the Traffic Event Discovery in Video Surveillance

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答辩日期：2016年5月

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摘　要

视频监控系统的广泛运用，为人们在交通管理和安全监督提供了很大的便利，然而这种便利需要耗费巨大的人力物力去干预和监督。随着科学技术的发展，视频监控系统智能化成为解决该问题的研究方向，但是目前针对异常事件发现的视频监控系统智能化仍不足以满足人们的需求。本文在实验室前课题组研究智能视频监控技术的基础上，研究道路交通事件检测技术并构建了一个道路交通事件检测系统。本文的主要工作如下：

（1）介绍视频处理中比较常用的运动目标检测方法并在不同场景下对检测效果进行比较，采用了效果较好的混合高斯模型。在阴影检测算法中，通过统计阴影区域像素在 的变化用高斯分布进行建模，从而根据概率大小完成对阴影像素的判断。在对运动目标跟踪算法的研究中，本文主要针对运动车辆，结合运动目标区域的重叠度和其颜色相似度完成对目标的跟踪。

（2）在对道路交通事件进行检测时，通过对违章掉头、违章停车、超速行驶等道路违章事件车辆行为特征进行分析和总结，利用对车辆的跟踪收集的位置信息完成对违章事件的检测。在计算交通参数时基于对车辆的跟踪结合不同交通参数的定义完成计算。研究了烟雾火灾检测技术用于检测道路上可能发生的车辆自燃现象。通过实验对不同的道路事件检测算法进行验证，取得了一定效果。

（3）在上述工作的基础上设计并开发完成一个道路交通事件检测系统，通过模块化和并行化处理使得该系统具有良好的可扩展性和实时性，并利用云计算技术融合课题组其他异常事件发现系统构建了基于云计算的异常事件发现系统框架。

关键词：视频监控系统；道路违章事件；交通参数；烟雾火灾检测

Abstract

Video surveillance systems that are used widely can provide people with a great convenience in traffic management and safety oversight, however, this convenience takes enormous human and material resources to intervene and supervise. With the development of science and technology, intelligent video surveillance system is a good solution to solve that problem, but the intelligent video surveillance system for abnormal event discovery is still insufficient to meet people's needs. Based on the research for intelligent video surveillance technology by laboratory members, we attempt to discover traffic events in the video through analyzing and summarizing the behavior and features of different traffic events, and build an exception event discovery system. The main contents of this paper are as follows:

(1) First we introduce different object detection algorithms and compare their effects in different scenes. Then the improved Gaussian Mixture Model is adopted. A Gaussian distribution is used to model the variation on FV/BV of pixels in the shadow area and then to determine whether a foreground pixel belongs to the shadow or not according to its probability value. Second after introducing some target tracking algorithms, we present a novel tracking algorithm about moving vehicles which combine the overlap area and color feature of a moving object.

(2) Combined with vehicle's tracking information, vehicle's illegal behavior such as illegal U-turn, illegal parking and overdrive are used to analyze and summarize to judge whether there is an illegal traffic event or not. They are used to get traffic parameters that the mathematical definition of traffic parameters and tracking information of cars. And the characteristics of smoke and flame are analyzed to detect the possibility of spontaneous combustion of the vehicle. Some good results are achieved in different experiments.

(3) Based on above work, an exception event discovery system is constructed which has good scalability and real-time response through using modular programming and parallel technique. And combined with other exception event discovery systems build by laboratory members, an exception event discovery system which is based on the cloud computing is constructed at last.

Keywords: Video surveillance systems; illegal road events; traffic parameters; smoke-fire detection

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