Bus passenger flow calculation algorithm based on HOG and SVM using Camera

1) School of Electrical Engineering and Automation

2) Project Introduction

Bus passenger flow statistics system as an important part of the intelligent public transportation system, Developing a fully automatic, efficient, and robust people counting system in surveillance scene is a subject of great scientific and commercial interest. For instance, traffic buses and railway stations can use this information to identify hourly traffic patterns, shopping malls and supermarkets can use it to analyze customer consumption habits, and security people can use it to monitor some key places and detect suspicious events. Due to its vast number of applications, many people-counting approaches and systems have been developed. Earlier attempts include the contact-type counters and IR beams. However, those approaches count people only one at a time and are not suitable for the high-density traffic flow at the entrance of a bus.

Recently, vision-based people counting has become a very active research area in the computer vision community. The main challenges come from complex interaction and occlusion among people. According to the number of sensors, the existing passenger counting approaches can be roughly classified into three categories: methods based on multiple camera, methods based on stereo camera, and single-camera-based approaches.

3) Main research contents and innovation points:

Passengers counting system play very important role in both business and security application. In this project we present a camera based vision system which is able to count passengers in crowed situation at the entrance of bus.HOG and SVM based algorithm is used to count the passengers entering the bus. In first step, HOG features of Passengers head is extracted using Machine learning method, SVM is used as the training method and the classifier for the linear model of target classification is obtained, then the heads are detected successfully. Next for head detection we use camshift through data correlation and the tracking by detection mechanism. the multiple target tracking is achieved and the head motion trajectory of passenger target is captured stably. After realizing the trajectory , automatic counting of bus passenger flow is observed. During the day time, the accuracy of proposed algorithm is significantly improved which can be observed from experimental results. The effective counting of passenger flow is achieved and the inward and outward passenger counting can be realized.

In next step we transplant the proposed algorithm to embedded system .ADI launched a new Blackfin processor for embedded vision applications having high on-chip memory. Blackfin series processors have maximum capacity, low power consumption, smaller size of processor, system cost is lower and also can work under high temperature environment. ADSP-BF608 and ADSP-BF609 are optimized for embedded vision applications, and are equipped with a high performance video analysis accelerator called "pipelined vision processor (PVP)". These processors have applications in industrial machine vision and security / monitoring system . therefore, the project intends to use ADSP-BF609 embedded platform for algorithm transplantation.. Transplantation algorithm steps are as follows;

1. Acquisition of ADSP-BF609 development board and evaluation board.
2. In-depth study of the ADSP-BF609 processor's hardware features and high level API.
3. In-depth study of the implementation details of each module of the passenger flow statistics algorithm
4. Call the ADSP-BF609 platform of the API library on the PC algorithm for approximation.
5. On site installation and commissioning;



Fig. 1 Example of a crowd on a traffic bus. Our goal is to count the number of passengers in video sequences such as this.

4) Main research achievements and Applications

This project is successfully implemented on practical basis .The project and the project research result is supported by Xiamen Lenz Communication co. LTD.

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