The Development of Smart Traffic Analysis System

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Abstract - Traffic density on roads directly affects the arrival time of emergency services. Effective monitoring of traffic flow and shortly time of traffic control will help facilitate the arrival time of emergency services. In this paper, some traffic monitoring measurements systems are included. Vehicle tracking algorithms are one of the systems that can provide traffic data, and the system can be configured to project visual images for analysis. Congested transportation is a key issue in Hong Kong. Being able to collect traffic density data for analysis can provide effective and substantive data for sustainable development. To provide unobstructed traffic, thereby reducing lane density and reducing obstruction to emergency services. There are video processing methods to understand traffic conditions. These systems can only capture different traffic conditions to evaluate traffic details. But it cannot control traffic conditions.

Keywords – Traffic density, monitoring, video processing

I. INTRODUCTION

Traffic congestion caused to uncertain commute times and even will be also delay emergency services. Effective monitoring of traffic flow and management of traffic for commuters can help to alleviate congestion issues to a certain extent and help facilitate the arrival time of emergency services. Accurate traffic information that help to better planning and select the traffic routing to enhance the timely response time of emergency services in chaotic traffic conditions [1].

In order to analyze traffic conditions on the road, general, will be used the induction coil, video cameras, ultrasonic sensors traffic monitoring purposes. The traffic sensors are difficult to obtain significant data of traffic density, especially to monitor all directions at crossroads.

From the point of view of cost effectiveness, cost of embedding sensors in the ground is expensive. Also, the sensors are required maintenance and long processing time of data transmission. If you need to replacement the sensors, that mean need to close the road, order to inconvenience. This project is aim to obtained the traffic analysis at Hong Kong to make emergency services more smoothly. Captioned used the software LABVIEW to evolve a detailed traffic analyze system by monitoring and providing visual aid for the real-time situation for better to planning the traffic routing enhance the response time of emergency services.

By using the Vehicle tracking algorithm, the system can capture the image of those vehicles passing through the concerned main road [2]. This system is able to obtain data for traffic density. In addition, it can extract the speed and vehicle recognition.

II. MEASUREMENT TECHNOLOGIES FOR TRAFFIC MONITORING

There are many different monitoring and measurement technologies have been developed to measure traffic data and analyze real-time traffic conditions [3]. It is difficult to chase vehicles to generate actual traffic information in crowded and dense traffic situations.

In chaotically traffic condition, the monitor system allowed to record vehicles movement. It found that many vehicles are in substantial clutter situation [3]. This system uses probabilistic inference to evaluate the rate of traffic flow by estimates the lane of traffic.

TABLE I
COMPARISON WITH VARIOUS METHODS

Technology	Advantages	Disadvantages
Image Processors	• Provide visible imagery with potential for incident management • Signal camera and processor can service multiple lanes • Rich array of traffic data available • Possibility of using same algorithms for day and night operation and avoiding day/night algorithm transition problems • Rich array of traffic data available	• Large vehicles can mask trailing smaller vehicles
Acoustic	• Potential for identifying specific vehicle types by their acoustic signature	• Signal processing of energy received by the array is required to remove extraneous background sounds and to identify vehicles
Inductive Loop Detectors	• Standardization of loop amplifier electronics • Excellent counting accuracy	• Reliability and useful life are a strong function of installation procedures • Traffic interrupted for repair and installation • Decreases life of pavement • Susceptible to damage by heavy vehicles, road repair, and utilities

For automatic traffic analysis, the key context of traffic monitoring to detect real time object movement and the implementation of establish an approach in tracking and classification system automatically working on color image generation method that able to detect conflict situations in traffic scene [4].

In addition to the processing methods, a color image algorithm based on visual traffic monitoring system has been developed to sequence traffic scenarios [5]. The image mining system can analyze traffic behavior with image sequences through background subtraction. [6].

The behavior of different traffic can be accurately captured and modeled.

For the improvement, real data generation for development of traffic plan is required. By adopting the background subtraction processing method, the system is equipped with the motion detection to become the vision-based monitoring system, which can provide significant data of traffic density.

III. SYSTEM DESIGN

The system will install a mounted monitor camera that focuses on the traffic scene and captures the actual image into the video frame. Use LabVIEW to extract useful and accurate traffic information from the image, such as speed, and traffic density, through appropriate image processing and data analysis programs.

LABVIEW is a graphical programming software that takes commands, and provides a platform for preprocessing and post-processing data. Using the visual aids with LABVIEW software, that can analyze traffic from various obstacles and from data analysis, create complex algorithms and evaluate measurement accuracy.

To facilitate the data analysis process, it is necessary to have a traffic field in the background subtraction application, and the moving foreground object and the video segment of the initial background reference frame N need to be used to track the object.

A. Design of Traffic Monitoring System

Captured video clips will be read and split into a few of frames. Each will be treated as a independent image and all video sequences assume a fixed background [7].

Then, the foreground object will be identified and generated by subtracting the background image from the given input. The difference between frames is calculated as a moving object within a certain time interval.

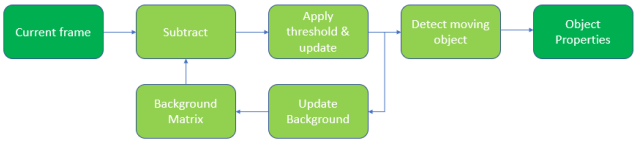

Fig.1. Detection of Moving Objects

Use the System Framework for identification in LABVIEW by (1) using a camera to obtain traffic video clip; (2) foreground moving objects Detections; (3) background objects image Registration; and (4) image capture. The background subtraction method was used in LABVIEW. The line profile is focus to analysis the colour range in RGB or grayscale format of specific frame.

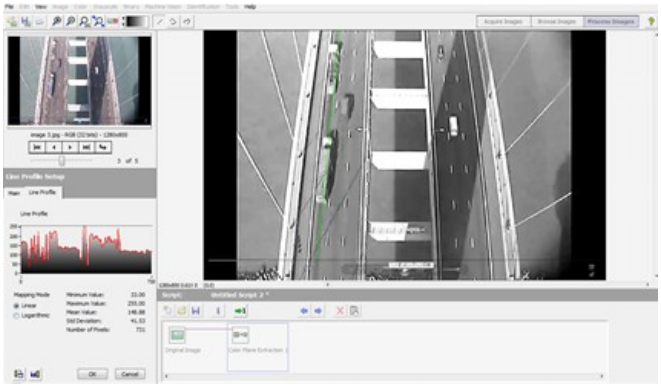

Fig. 2. Vehicles identification in LABVIEW

B. Testing of Traffic Monitoring System

The system apply cluster Method to process the video and Image. They included (1) Manual to select the required data; (2) Analysis the cluster; (3) Check Data similarity; and (4) Data simplification between distance with characteristics.

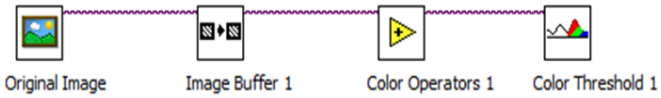

Fig. 3. Cluster Method for image and video processing

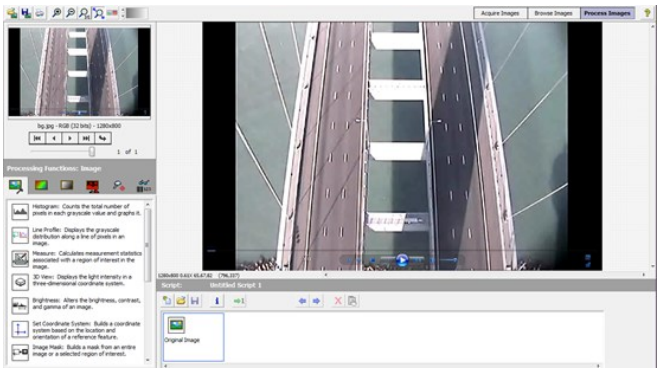

Fig. 4. LABVIEW NI Vision Assistant script

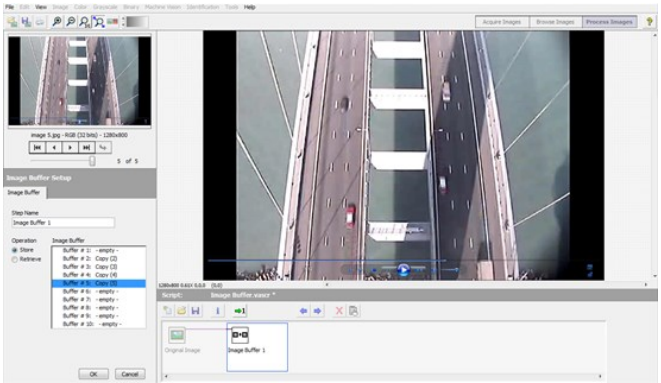

Fig. 5. The background images

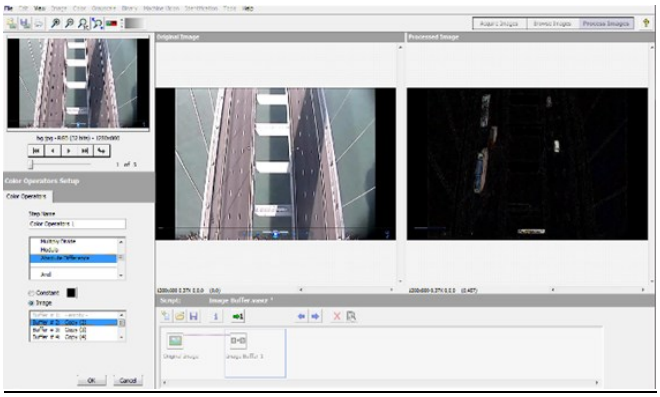

Fig. 6 Store the sample image into image buffer setup for subtraction process

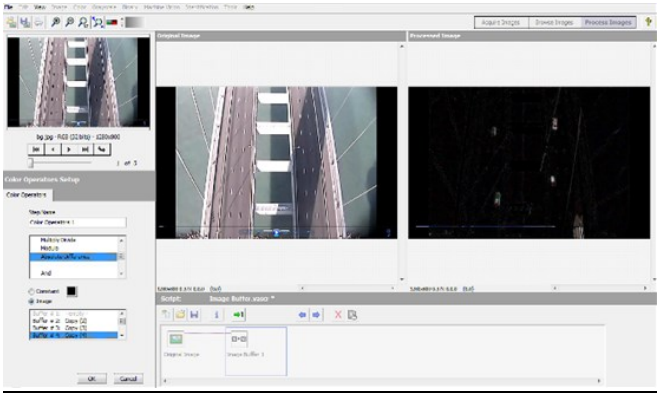

Fig. 7. background subtraction afterwards

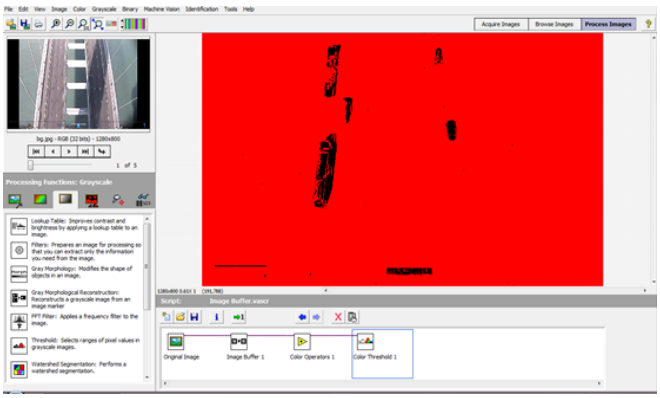

Fig. 8. Images are processed by subtraction (4 sample)

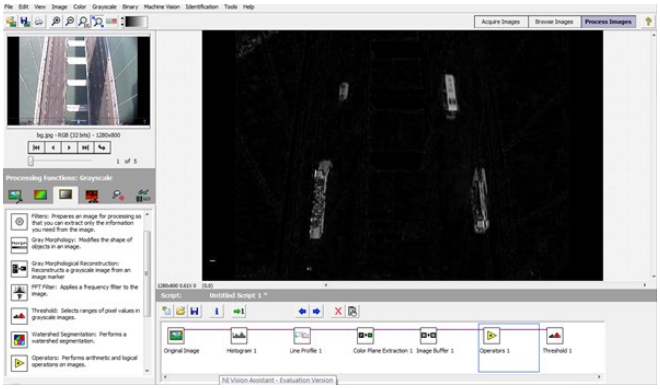

Fig. 9. Particles has been captured

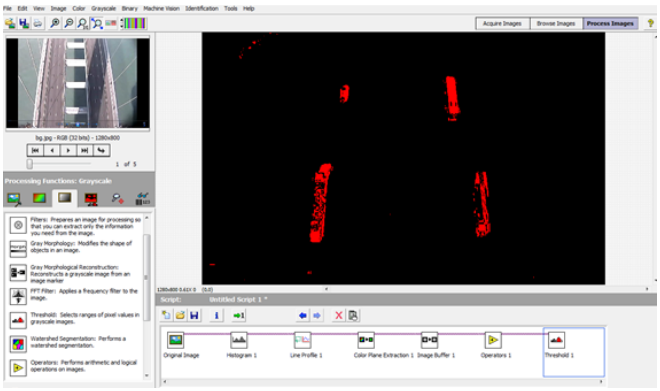

Fig. 10. The image was processed

Fig. 11. Edge Detection

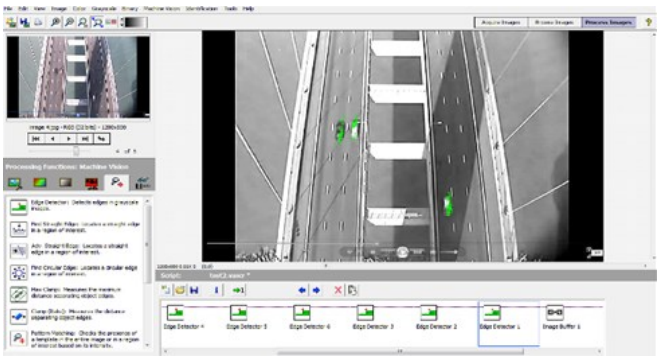

Fig. 12. Drawn in the each vehicle lane

IV. DISCUSSION

The challenges are image processing affected by the different lighting conditions. In order to solve the problem, the different lighting conditions was added to as background frames. The background frame is changed in every one hour and recorded. The final algorithm is made to deal with lights variations that adopt as many as various background to generate the outputs is accurate..

V. CONCLUSION

In this project, we proposed to use the Virtual Instrumentation software of LABVIEW to estimate the density on the traffic road from the image analysis of the chaotic traffic conditions in Hong Kong. This data is very

helpful to improve traffic.

Due to the accurate rate, the system is able automatically calculate traffic density and provides comprehensive images in real time to provide sufficient and accurate traffic information. Video Processing through image analysis, the system functions can automatically the traffic monitoring functions, which reduces the manpower to monitor and reduce human errors, thus reducing the cost of the traffic monitoring system. All in all, the accurate availability of traffic information and its practical application will be of great help to future extension works.

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