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The Vehicle Detection Algorithm based on Intelligent Video Image Processing Research

Qiuyue Fan

Guangdong Polytechnic of Science and Technology, Zhuhai, Guangdong, China 519090
qiuyue0927@163.com

With the development of science and technology at the present stage, intelligent video surveillance system widely used in all walks of life. Especially in the extraction of vehicle information is outstanding, but the weather, light and a series of factors will affect the accuracy of the moving vehicle detection, increased the difficulty of moving target extraction. Through the analysis of the existing target detection technology, a fusion of background modeling method is put forward. Experiments show that the algorithm is to obtain information faster and high accuracy.

Keywords: Intelligent video; Image processing; Vehicle detection

1 Introduction

Traffic is one of the four basic conditions of human survival, good transport system of a direct impact on a regional and even national economic situation. In our country, rapid economic development makes the rapid growth in car ownership, traffic supply can't meet the needs of traffic flow. Effectively solve the traffic problems, widen the road, alone is not enough to build overpass etc. hardware update, the need to adopt efficient traffic detection and control method. The traditional traffic detection technology in our country includes coil method and wave frequency test. At the same time, the traffic monitoring system based on video image processing JianChe installation and maintenance, and the normal traffic order will not be affected, the information is, the scope is wide, can cope with sudden traffic conditions [1-3].

2 Related works

2.1 Image filter processing

In the process of image acquisition, transfer, or processing can produce noise, image actually often affected by some random error and produce degradation, usually called the degradation of noise. Image denoising is to remove the noise, get high quality image, which makes the extraction of the target feature is not affected by other interference.

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Frequency domain denoising method is to convert the image from the spatial domain to frequency domain, because the image noise is corresponding to the image of high frequency signals, to deal with the noise in the frequency domain, and then get back to the image in spatial domain, the denoising effect. Main frequency domain denoising method with wavelet transform and Fourier transform, the Radon transform, etc. But frequency domain denoising algorithm computational complexity and memory space is large, is not suitable for real-time vehicle detection system [4-5].

2.2 Image segmentation

Image segmentation is the first step in image analysis and other analysis process mainly depends on the effect of the result of image segmentation, whether to obtain accurate segmentation results directly affects the subsequent analysis of the effect. Moving target extraction of the main purpose is through a series of image processing algorithm for motion prospect information, and splits out after eliminating the shadow interference of moving targets. Parts in this paper, moving target extraction based on threshold image segmentation is used, based on the edge of the image segmentation [6-7].

According to from top to bottom, from left to right to read each pixel image, will be the same and meet each other connected rules grey value of the pixels in a collection. Binary image of the two pixel areas connected to satisfy two conditions, one is their gray value must be the same, 2 it is to satisfy the space. Are often used in the space between the pixel contact for four adjacent and eight adjacency. Basic relations of the adjacent pixels is simple, in the image, in addition to the edges of the image, each pixel has adjacent points.

3 Moving target detection and background extraction algorithm analysis

3.1 Moving object detection algorithm

Between her virginity in finite difference method is mainly used for two consecutive frames corresponding pixel difference algorithm, the difference figure by setting the threshold of binarization, differential value is greater than a certain threshold, the judgment for the moving point, finally will be detected by the moving target binary graph connectivity and morphological processing, if the connected area is greater than the setting threshold, conform to the target area scope, is judged to be moving targets. As shown in the flow chart of 1.

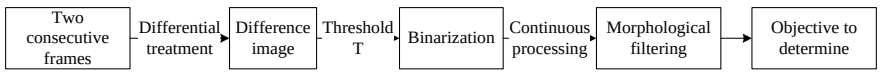


Fig.1 The flow chart of interframe difference method

Because interframe difference method chosen is continuous sequence of tilting, short time interval, so the light effect is very small, and its update speed, can be a good real-time performance. But as a result of this method to detect is the change of movement, so the detected target is not continuous and accompanied by wave interference, need further use connectivity and morphological filtering processing, connecting scattered the whole and remove the detected noise, then and targets set by the product range of threshold value, meet the conditions of the determination for moving targets, does not meet the judgement of interference and noise removing. In the actual video monitoring, if moving target with slow or gray uniform distribution, the target area can produce hollow effect of detection, can't detect the complete movement goal or to complete the target partition [6-8]. It can in the case of don't know any scene accurately detect moving object, but the method of calculation is too complicated and antinoise performance is poor, used to process real-time traffic video not good reflect its advantages [8].

3.2 Common background extraction algorithm

Comparing the above three algorithms of comprehensive treatment effect, select background difference method as the research object. Common methods how to build background model frame averaging method, histogram statistics background modeling method. More than average method is based on statistics theory, in a certain statistical time, change caused by moving objects in image sequence can be offset each other. Frame averaging method will be more understood as a vehicle noise, through the type (1) the average of the calculated pour more, eliminate movement by using the method of average vehicle caused by the change, so as to get the same point of background pixels.

$$b(x,y)=\frac{1}{N}\sum_{i=1}^{N} f_i(x,y) \quad (1)$$

This method is more, average method for background extraction effect is better, but for the distance of moving targets, relatively close shot speed slower, longer for background of coverage, can lead to a statistical error, the background of the vision effect is close to. Also, this method in order to get a better effect on background, select the number will reach a certain number, higher requirements for data storage [9-12].

4 Background modeling method based on fusion research

4.1 Background modeling algorithm

Different levels of histogram is a kind of the same variables corresponding to the frequency expressed in rectangular bar chart, the area of the rectangular bar or highly on behalf of the corresponding frequency. For gray image, the image is level with the

grey value, said the frequency or the number of occurrences of each gray level in the image. And combining the pixel mean peak as a reference, when there are multiple peak, will each histogram peak compared with corresponding to pixels of the mean, choose the most close to the average peak as the background grey value, the background model is set up. Method design flow chart shown in figure 2.

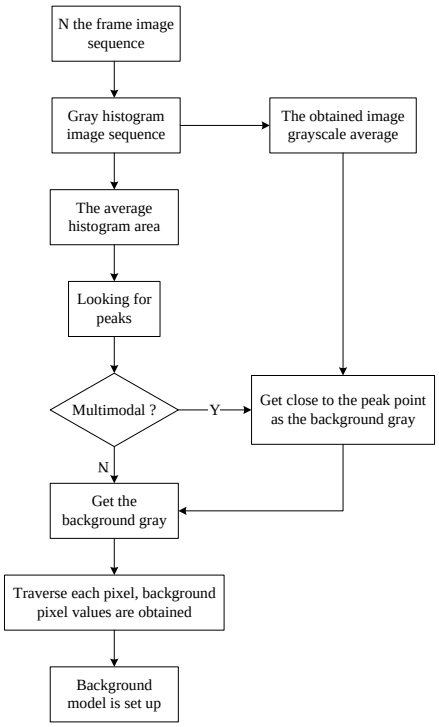


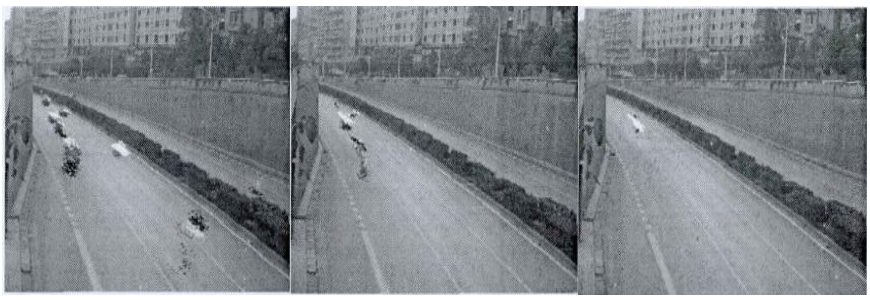
Fig.2 Background modeling flowchart

Under the condition of the traffic scene is complicated, passing vehicles to background covering time is not long, or in the case of vehicles bodywork color close, foreground points frequency and background of grey value of grey value frequency may produce peak at the same time, a multimodal state. In order to solve this multimodal state caused by the interference, can be calculated through the video sequence in pixels of the mean, using the gray average for reference, for further judgment [13-15].

4.2 The experiment results analysis

For this method to establish the background model, USES the frames in order from left to right in figure 25, and 65, respectively. Can be seen from the diagram, for the fast moving target, such as movement in the front of a blue car, 25 frame has a clean background can be detected. Comparison results figure, 65 frames of background model has high accuracy, and operation cost is not high.

(a) Video 1 rendering



(b) Video 2 rendering

Fig.3 Background modeling effect

Compared with median filtering, this method has a better anti-jamming ability, more can deal with the complex traffic conditions; The frame difference method, the smell can effectively solve the problems of the ghosting, and can use less, get more accurate background effect; For the more traditional histogram statistics method, can be effective treatment of slow movement and vision object, get the ideal background model. To establish the initial static background, the effect of this method is good, but if have to deal with dynamic video, will want to consider the problem of computation and storage capacity, more want to consider the real-time updating of background.

5 Conclusion

In this paper, the detection algorithm of moving vehicles in the related research, introduces several common methods of target detection, puts forward the histogram statistics method and smoothing the pixel initial background model is established with the method of average, frame average method can effectively solve the ghosting effect. Combined with single gaussian model, using the histogram method to establish the initial model, using the method of single gaussian model update background model, not only can save a clear straight Fang Ge tectonic background required a large amount of storage space, you can also get real-time background, solve the problem of the histogram statistics background model update.

References

1. Liu, H., Chen, S., Kubota, N.: Intelligent Video Systems and Analytics: A Survey [J]. IEEE Transactions on Industrial Informatics, 2013, 9(3):1222-1233.
2. Prati, A., Vezzani, R., Fornaciari, M.: Intelligent Video Surveillance as a Service [M]. Springer Berlin Heidelberg, 2013.
3. Moon, HM., Chae, SH., Moon, D.: Intelligent video surveillance system using two-factor human information[J]. Telecommunication Systems, 2013, 52(4):2249-2257.
4. Holman, T.: Intelligent Video Quality Adjustment: US20150249848[P]. 2015.
5. Rho, S., Rahayu, W., Nguyen, UT.: Intelligent video surveillance in crowded scenes [J]. Information Fusion, 2015, 24:1-2.
6. Dai, J., Zhao, Y., Liu, Y.: Cloud-assisted analysis for energy efficiency in intelligent video systems [J]. Journal of Supercomputing, 2014, 70(3):1345-1364.
7. Yeh, WM.: New Vision for Intelligent Video Virtual Reality [M]// Modern Advances in Applied Intelligence. Springer International Publishing, 2014:199-206.
8. Li, Y., Li, B., Tian, B.: Vehicle Detection Based on the and– or Graph for Congested Traffic Conditions [J]. Intelligent Transportation Systems IEEE Transactions on, 2013, 14(2):984-993.
9. Satzoda, RK., Trivedi, MM.: Efficient Lane and Vehicle Detection with Integrated Synergies (ELVIS)[C]// 2014 IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW). IEEE Computer Society, 2014:708-713.
10. Wang, J., Sun, X., Guo, J.: A Region Tracking-Based Vehicle Detection Algorithm in Nighttime Traffic Scenes [J]. Sensors, 2013, 13(12):16474-16493.
11. Chong, Y., Chen, W., Li, Z.: Integrated real-time vision-based preceding vehicle detection in urban roads [J]. Neurocomputing, 2013, 116(10):144-149.
12. Wang, C., Zhao, H., Guo, C.: Visual-based on-road vehicle detection: A transnational experiment and comparison[C]// Intelligent Vehicles Symposium (IV), 2015 IEEE. IEEE, 2015.
13. Li, Y., Wang, FY.: Vehicle detection based on And–Or Graph and Hybrid Image Templates for complex urban traffic conditions ☆[J]. Transportation Research Part C Emerging Technologies, 2015, 51:19-28.
14. Tang, Y., Zhang, C., Gu, R.: Vehicle detection and recognition for intelligent traffic surveillance system [J]. Multimedia Tools & Applications, 2015:1-16.
15. Garcia, F., Prioletti, A., Cerri, P.: Visual feature tracking based on PHD filter for vehicle detection[C]// Information Fusion (FUSION), 2014 17th International Conference on. IEEE, 2014:1-6.

