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Research Article

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The implementation of intelligent transportation system based on the internet of things

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ABSTRACT

This paper through a careful study of intelligent transportation system architecture and related theory, propose a kind of design of intelligent transportation system under the environment of Internet of things. At the same time, according to the application, propose the Ada Boost deployment algorithm. First, describe the intelligent transportation system the histogram intersection technologies, and be based on the analysis of the functional requirements of the euclide an distance to design the hierarchical model and the overall scheme of gateway.

Key words: transportation; intelligent system; internet of things

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INTRODUCTION

Intelligent transportation system effectively used advanced technology in the Internet of things，such as communication, information and control technology, and realized the real-time, accurate and efficient management of transportation .With The introduction of the Internet of things technology, the service mode of intelligent transportation system and the system architecture have changed dramatically. Intelligent transportation system based on Internet of things includes the wireless sensor network, telecommunication network, Internet, etc. Because of the system network environment is extremely complex, intelligent transportation system is facing how to realize the network interconnection.

The Internet of things is an important part of information technology in the new generation, it can also be said that "the Internet of things is an internet which is connected with things". Through RFID technology, infrared sensors, GPS technology, intelligent perception, recognition technology and pervasive computing, combined with the application of ubiquitous fusion network, it can exchange information, the Internet of things is the expansion and the application of the Internet that is mainly about business and the application of innovation,which can realize the intelligent identification of goods, location, tracking, monitoring and management. Here the "things" should meet the following conditions that can be incorporated into the scope of the "Internet of things": 1. it should have a receiver that can receive the corresponding information; 2. it should have data transmission path; 3. it should have a storage function; 4. it should have CPU; 5. it should have the operating system; 6. it should have the specialized applications; 7. it should have data transmitter; 8. it should obey the communication protocol of the Internet of things; 9. it should have unique number that can be identified in the network.

2 Vehicle Detection And Recognition Principle

This method of processing is divided into two stages: vehicle detection (or location) and vehicle recognition. First, a machine learning algorithm, based on Haar-like features, and an AdaBoost algorithm are applied to train a classifier for the vehicle location on the input image. Then, additional training is performed using a PCA classifier to learn recognition from samples of different types of vehicle, as is shown in Fig 2.

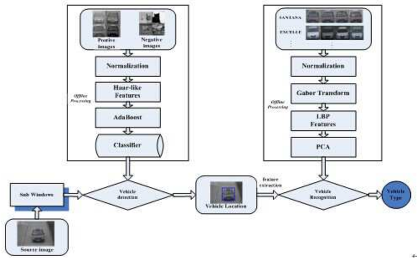

Fig 1. Flowchart of the vehicle recognition system

3 Vehicle Detection

3.1 Haar-like feature

A Haar-like feature is well known as a local texture descriptor, which can be used to describe the local appearance of an object [19]. A Haar-like feature measures the average pixel intensity differences of the rectangular regions, as is shown in Fig. 3. The value of a Haar-like feature is that it defines the difference between the sum of the pixel values of the black region and the white region. When we change the position, size, shape, and the arrangement of the Haar-like temple, the object feature information, such as the intensity gradient, edge, or contour can be captured. As is shown in Fig 2, the vehicle image includes saliency rectangle characteristics, where the Haar-like feature is especially suitable for description purposes. In order to reduce the computation time of the Haar-like feature, the integral image can be adopted as the intermediate representation [20].

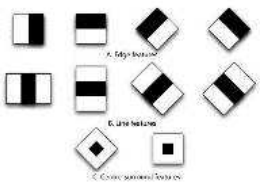

Fig 2. Haar-like feature

3.2 Adaboost Algorithm

The purpose of the AdaBoost algorithm is to use the feature (i.e., the Haar-like feature previously discussed) to discover the best weak classifiers, and then combining these weak classifiers to a strong classifier after a series of training exercises with a huge set of positive and negative samples of a target object [21]. After long time training, the strong classifier can be applied to detect the target object.

The Adaboost algorithm can be described as follow:

A. Giving a set of samples $(x_1, y_1), (x_2, y_2), \ldots (x_n, y_n)$, While, $y_i = 1$ denotes a positive sample (vehicle) $y_i = 0$ denotes a negative sample (non vehicle). n is the number of samples.

B. Normalize the weights $w_{1,i} = D(i)$

C. For $t = 1,2,3 \ldots T$:

(1). Normalize the weights: $q_{t,i} = \frac{w_{t,i}}{\sum_{j=1}^{n} w_{t,j}}$

(2). For each feature f, Training a weak classifier $h(x, f, p, \theta)$,and generate the weight sum of error rate $\varepsilon_f = \sum_i q_i |h(x_i, f, p, \theta) - y_i|$. The weak classifier $h(x, f, p, \theta)$ is defined as:

$$h(x, f, p, \theta) = \begin{cases} 1 & pf(x) < p\theta \\ 0 & otherwise \end{cases}$$

(3). Choose the best weak classifier $h_t(x)$ (with the lowest error ε_t): $\varepsilon_t = \min_{f,p,\theta} \sum_i q_i |h(x_i, f, p, \theta) - y_i|$

(4). Update the weights: $w_{t+1,i} = w_{t,i} \beta_t^{1-e_i}$.

D. The last strong classifier is: $H(x) = \begin{cases} 1 & \sum_{t=1}^{T} \alpha_t h_t(x) \geq \frac{1}{2} \sum_{t=1}^{T} \alpha_t \\ 0 & \text{otherwise} \end{cases}$, Where $\alpha_t = \log \frac{1}{\beta_t}$

3.3 Vehicle detecting

The detection of the vehicle is done by sliding a sub-window across the image at multiple scales and locations. In order to reduce the detection time, the scaling is achieved by changing the detector itself, not the scaling of the image, to ensure the same computational cost can be used at any scale . The initial size of the detector is 15x15, the detector window is scaled at 1.2, and the transform step is 2 pixels. Using the cascade classifier obtained in the previous approach, we can decide whether an image region at certain location is classified as a vehicle or a non-vehicle, as is shown in Fig. 3.

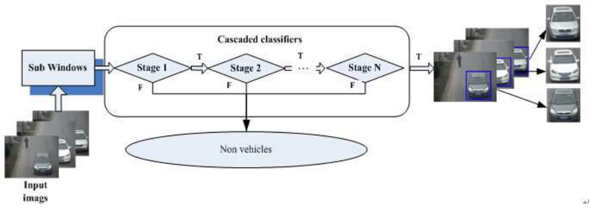

Fig 3. Procedure of vehicle detection

4 Vehicle Representation Based on Lgbphs

The vehicle image can be translated and described as a model called a Local Gabor Binary Pattern Histogram Sequence [23], which is illustrated in Fig. 5. The approach contains the following procedures: (1) collecting some vehicle images as input samples for the same type vehicle and then transforming the average image of one type vehicle to a Gabor magnitude picture via the frequency domain using Gabor wavelets filters; (2) extracting the LBP for each Gabor magnitude picture; (3) dividing each LBP picture into rectangle regions $R_0, R_1 ... R_{m-1}$, and then computing the histogram for each region; (4) concatenating the histograms of each region to form the final histogram sequence, which represents the original vehicle image; (5) Measuring the vehicle's similarity with the histogram's feature vector after the dimension reduction via PCA . This procedure is described in detail in the following sub-sections.

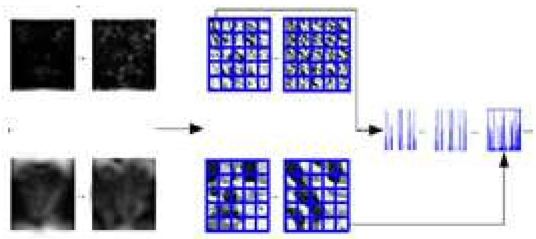

Fig 4. Framework of the proposed vehicle recognition approach

Experiment analyze

For the intelligent traffic, traffic flow video processing requirements of precision and real-time is very high, in order to perform the various traffic flow video contrast, this paper adopts three kinds of road conditions to test. The three kinds conditions are less traffic flow and no shadow、large vehicle flow and complex 、vehicle shadow. Through the simulation experiment, drawing as that part of the results fig 5 are shown:

Fig 5.Vehicle shadow

CONCLUSION

This paper, according to the overall plan completed by the gateway hardware circuit design. Meanwhile, finished the gateway application software design on the basis of functional requirements.Experiment and simulation results show that the gateway can build ZigBee network， wirelessly connected to GPRS network, and be wired Ethernet access.This thesis implemented the gateway with multimode access, mufti-protocol conversion, ad-hoc network, etc. and gateway deployment algorithm can obtain the gateway deployment strategies.

REFERENCE

[1]Y. Peng, J. S. Jin, S Luo, et al. Vehicle type classification using data mining techniques[M]. The Era of Interactive Media. Springer New York, **2013**: 325-335.
[2]S. Fazli, S. Mohammadi, M. Rahmani. *International Journal of Software Engineering & Applications*, **2012**, 3(3): 17-22.
[3]S. Wang, L. Cui, D. Liu, R. Huck, P. Verma, J. J. Sluss, and S. Cheng, *IEEE Trans. Intell.Transp. Syst.*, vol. 13, no. 2, pp. 955–962, Jun. **2012**.
[4]K. T Sam, X. L Tian. *International Proceedings of Computer Science & Information* Tech, **2012**, 25: 91
[5]A. P. Psyllos, C. N. Anagnostopoulos, E. Kayafa. *IEEE Transactions* on, **2010**, 11(2): 322-328.
[6]V. Petrovic and T. Cootes, Analysis of features for rigid structure vehicle type recognition[C]. in Proc. Brit. Mach. Vis. Conf., **2004**, pp. 587–596.