Developing an Integrated Smart and Stable Driving System Linked Abnormal Data Detection Algorithm

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ABSTRACT

This paper proposes a fog computing-based crowd-sensing detection scheme for abnormal data in the Internet of Vehicles. The traditional cloud computing-based detection scheme has problems such as heavy computing tasks on the central server and too long detection time. To solve this problem and give full play to the computing power of the crowd-sensing terminal, this paper proposes a generalized vehicle following model considering the influence of multiple vehicles ahead based on the intelligent driver model. To improve the stability of traffic flow, considering the speed difference between P vehicles ahead and own vehicle, and adding the influence of the nonlinear weight index, the generalized stability conditions of the new model are obtained through linear stability theoretical analysis.

INTRODUCTION

In recent years, with the continuous growth of the number of cars, the road-carrying capacity of many cities has been nearly saturated [1], and the problem of road congestion has become increasingly serious. The successful application of Io V technology in intelligent transportation systems makes it considered the best method to solve the problem of road congestion [2], which has attracted the interest of a large number of researchers. in performance. The microscopic process is that the vehicle starts [3], and the driver perceives the external information such as the road and the traffic environment; makes a comprehensive analysis and then makes a decision; and finally changes the running status of the vehicle through a series of driving operations [4].

However, at present, electric vehicles all use wires for power transmission, which have the following drawbacks: excessive charging current [5], large wire loss, and high cost of high-purity wires; charging physical connection ports are greatly worn, low life, air gaps, and prone to sparks; cable Heavyweight, unfavourable for portability [6], complex insulation process, and great impact on the environment. Highway traffic monitoring has the characteristics of fine data granularity, high data exchange frequency [7], and large exchange data volume. In the analysis of actual monitoring data, there are individual abnormal data pairs. The final analysis results have a greater impact on the problem [8].

It is necessary to investigate abnormal situations according to the subsequent video playback before data analysis. In this case, it is impossible to make real-time judgments and alarms. At the same time [9], it is also necessary to continuously monitor the activities in the scene. The workload is huge and the work Personnel monitoring the monitoring screen for a long time will cause visual fatigue [10]. Under the influence of human visual fatigue, the rate of missed detection and false detection will be very large [11], which lays the foundation for the proposal of an intelligent video monitoring system. In the network environment, if the password of a legitimate user is not encrypted, it may be intercepted in the middle, so that the hacker can enter the network as a legal identity [12].

In December 2012, DOT further released the "ITS Strategic Research Plan [13]: 2015-2019", which discussed and established the focus and theme of the next-generation ITS research and development in the United States, that is, to further improve the safety [14] and fluency of the Internet of Vehicles to meet the increasing demands of the Internet of Vehicles. complex research needs [15]. After a long period of development, the University of Reading in the United Kingdom has carried out research on the tracking of vehicles and pedestrians [16] and their

interaction recognition. and other companies are also gradually applying vision-based gesture recognition interfaces to the commercial field. Traffic stability research relies on basic traffic models [17], and micro-vehicle following models have achieved many results, which greatly promotes the use of traffic flow models in simulation. aspect application [18]s.Bando proposed the optimal velocity model (ovM) in 1995; Nagatan analyzed the linear and nonlinear Kd V and mKd V equations [19] of a pair of car-following models; Len Fau discussed the forward observation of the traffic of multiple vehicles The three-axis acceleration of the vehicle is obtained through coordinate rotation [20], and the vehicle speed information obtained from the built-in GPS of the mobile phone is used to judge the bumpy condition and braking condition of the vehicle, and then judge whether the traffic condition is good; Reference [21] evaluated the intelligent Performance of mobile phones for real-time traffic flow prediction.

All of the above studies have verified the feasibility of applying crowd-sensing technology to data collection in the Internet of Vehicles. For example, Shinar [22] used a multifactor analysis method to study the influencing factors of aggressive driving behaviour; Taubman [23] analysed the aggressive driving willingness of drivers under different emotional induction by comparative analysis. Classification is a kind of data mining technology. A common data analysis method, which aims to map unknown data tuples to a certain category of a given category by comparing [24] the existing attributes of the data. Only through proper clustering can things be easy to study, and the internal laws of things can be grasped by human beings. The so-called clustering is based on certain attributes of things [25], indicating that positive emotions can weaken the willingness to drive aggressively; and there is no significant difference between men and women. By exploring the key factors affecting the charging efficiency of wireless charging, and giving corresponding ideas and methods to improve the charging efficiency, a green smart car based on wireless power transmission technology is designed [26].

THE PROPOSED METHODOLOGY

A.   Anomaly Data Detection Algorithms

The spatiotemporal feature point is a local information representation method that can directly analyze and understand the events of interest in the behaviour. The discrete spatiotemporal feature points can capture the position where the pixel value changes drastically in the spatial and temporal directions of the video image.
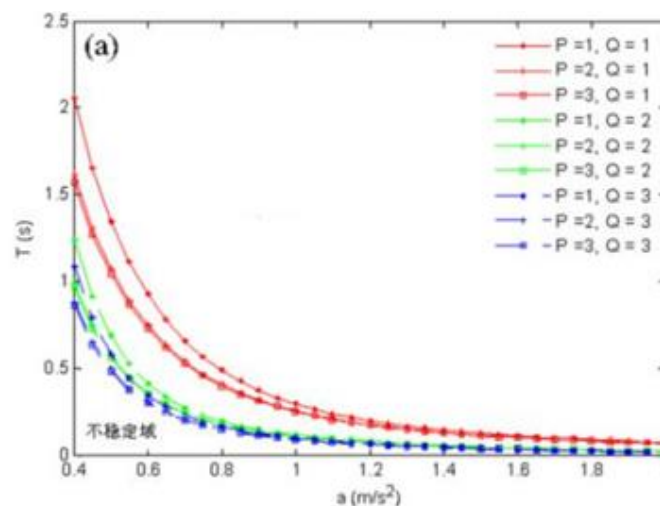

Fig. 1. Anomaly Data Detection Algorithms

The Fruit Fly Optimization Algorithm (FOA) is a group behaviour-based, multi-parallel pathway model for constructing animal autonomous bodies. The fruit fly algorithm m is similar to the ant colony algorithm and the particle swarm algorithm, and it is a new method to seek global optimization based on the foraging behaviour of animal groups. In the abnormal behaviour detection in this paper, behaviours such as fainting and fighting are regarded as abnormal behaviours, and behaviours such as walking and running are normal behaviours. Also known

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as feature-based knowledge-based intrusion detection systems Misuse detection searches for different intrusion/attack pattern features to match known intrusion features stored in the knowledge base in advance, so misuse detection can only detect those already in the knowledge base. defined intrusion.

The overall idea of the method is as follows: First, use NERF C. to describe the spatiotemporal feature points of the learning samples (abnormal behaviour). Mean method clustering. The abnormal data physical determination method mainly refers to the method of setting a threshold for the inspected data and determining the data exceeding the threshold as abnormal data and eliminating it. It is a relatively traditional and rough abnormal data determination method. The main idea of introducing the physical detection method into the field of Internet of Vehicles is to apply the traffic flow theory to set corresponding thresholds for different types of traffic data. If the detected data exceeds the threshold, it is determined as abnormal. The amplitudes of each cell are accumulated to form a high-dimensional feature vector for identification. To normalize the duration of the motion, they assume that the human motion behaviour is periodic, and decompose the entire sequence into a cyclic process of motion behaviour Neighbour algorithm for behaviour recognition.

The environmental feature point set collected by the sensor nodes is different from the general data point distribution pattern, with a large number of normal values.

B. Research on the Stability of Intelligent Driving Systems

From a micro-vehicle perspective, traffic flow stability research is all about figuring out what happens when a "jamming signal" is passed from one vehicle to another. A platoon on the road travels at the same distance and the same speed. It is assumed that this uniform traffic flow state is the equilibrium state of the platoon system. In the swarm perception car networking, due to the limited sensors in smart terminals such as mobile phones or tablet computers of swarm users, in practical applications, the data we need cannot be obtained directly from its built-in sensors, but the read sensors must be read first. The data can only be obtained after some transformation.
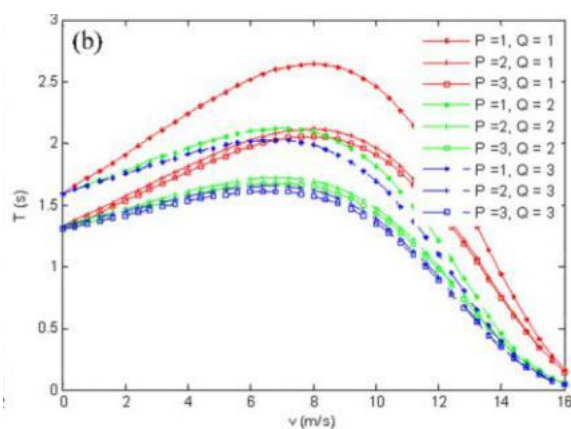

Fig. 2. Stability of Intelligent Driving System

Electromagnetic tracking is a detection scheme that judges road conditions according to the high-frequency electromagnetic field emitted by a specific road and is usually used in the fields of automobile model testing and smart car production. For the electromagnetic tracking smart car, the electromagnetic sensor is undoubtedly the "eye" of the smart car, and its distribution affects the detection accuracy and accuracy. Under the leadership of the main thread, the sub-threads start the heuristic search engine by relying on prior knowledge such as experience base and knowledge base respectively. If necessary, rely on the rule base to start a blind search engine. Before any sub-thread starts any engine, the detection and identification of positive abnormal behaviour can be regarded as a binary classification problem to a certain extent, so a support vector machine can be used to train and learn the behaviour to obtain the SVM model, and then the to - be-detected Video segments are fed into the model for classification prediction.

The degree of abnormality is expressed by the nearest neighbour distance from the detected point to this set. Here we consider changing the idea. Since we have found out whether the normal set can be considered to judge the detected point by considering the abnormal set other than the normal set through the previous method Whether it is within the range of the abnormal set. After a certain period, the fluctuation completely disappears, and the system will return to the equilibrium state. The traffic jam phenomenon can be regarded as the instability phenomenon of the traffic flow. Therefore, the stability of traffic flow is the key to the research on the mechanism of urban traffic congestion and has very important theoretical research significance and practical application value.

C. Intelligent Driving Stability Based on Abnormal Data Detection Algorithm

If the conditions of Equation (20) or Equation (21) can be satisfied, then when the vehicle system is disturbed and the vehicle motion deviates from the uniform flow state and causes vehicle speed fluctuations, the vehicle speed fluctuations will gradually weaken after a certain period. and disappears, the system returns to the state of uniform flow; otherwise, the fluctuation of vehicle speed will continue to increase, and the system will be farther and farther away from the state of uniform flow, and eventually evolve into a congested flow. And proved its rationality; some scholars also proposed some functions to test the validity of clustering to calculate the optimal number of clusters kept. The effectiveness measurement method based on cluster distribution is used to evaluate the clustering effect under different numbers of clusters.

The theoretical basis of structural risk minimisation introduces the classification principle and steps of the support vector machine and then introduces the construction of the support vector machine model and the selection method of relevant parameters, which lays the foundation for the rational application of the support vector machine to abnormal behaviour detection. To be more sensitive to the alternating magnetic field, we use a forward-looking pre-processing scheme. Using the ADS114S06 processing chip, the collected analogy quantities can be better converted into digital signals. Data normalization processing is a non-dimension-based processing method. The principle of structural risk minimization is essentially to find a suitable decision function candidate set r, and then select a decision function in 11 according to the empirical risk minimization principle.

The structural risk minimization principle for classification problems is: to select a decision function r about the parameter t. We select the vehicle speed information obtained in an experiment as a sample for kernel density estimation. Figure 4-2 shows the kernel density estimation curve obtained by different kernel functions under the optimal window width selection based on this sample. As can be seen from the figure, the kernel density estimation results are about the same. Therefore, the most important factor affecting the kernel density estimation results is the determination of the window width A.

EXPERIMENT

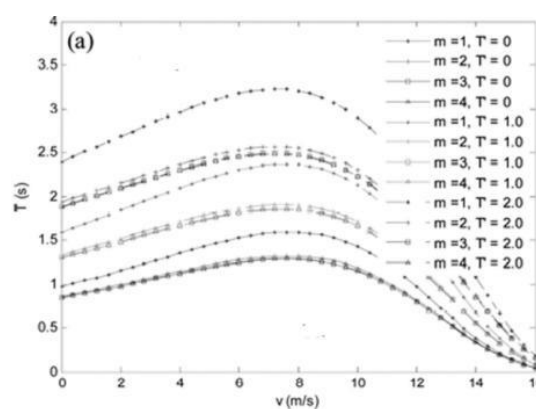The abnormal data detection algorithm is shown in the figure.
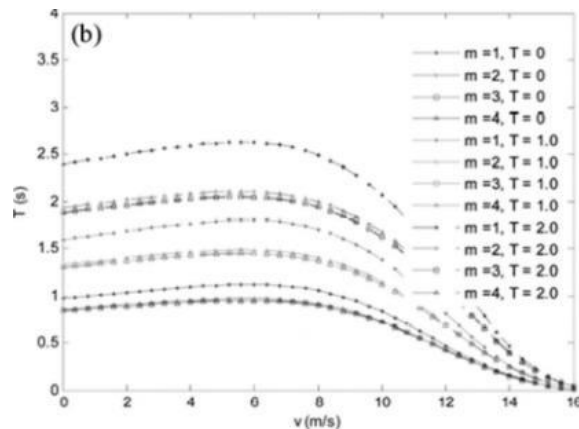

Fig.3. Anomaly Data Detection Algorithms

Fig.4. Intelligent driving system stability

CONCLUSION

In this paper, an extended model of the intelligent driver model is proposed by using the speed difference and distance information of multiple preceding vehicles, and the critical stability conditions of the extended model are analysed through the linear stability theory. Considering the impact of abnormal data on subsequent modelling research, we use the K-means clustering optimization algorithm of swarm intelligence is improved to detect outliers in the experimental data set. The results show that the optimal number of clusters for the data is 2, and the outlier data with a large difference from the normal value is analysed. In this paper, the MapReduce-based fruit fly optimized K_ means clustering algorithm is applied to the massive highway traffic monitoring data.

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