Research on the Supervision of vehicle 4G Video Surveillance platform in Freight Company

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Abstract—In order to solve the difficult problem of dynamic driving detection in vehicle transportation for a long time, Jiaozuo Transportation Bureau took the lead in using 4G platform for dynamic supervision of driver behavior, so as to reduce driving accidents. According to the data provided by Jiaozuo freight company, this paper analyzes the internal relationship among vehicle qualified rate, 4G video vehicle monitoring and evaluation project score and alarm record. And according to the relationship between the three, we use SPSS software to analyze the correlation and cluster of freight companies, and study the closed-loop disposal and company policy of companies with good operation.

1 INTRODUCTION

In order to improve driver safety, Jiaozuo City gradually uses on-board 4G video surveillance platform to monitor driver behavior and vehicle status. Through the monitoring platform, we can judge whether the driver has fatigue, speeding, distraction, answering phone calls, whether the vehicle is speeding, track deviation and other problems, to achieve dynamic supervision of driving behavior, process supervision, so as to reduce the hidden dangers of driving accidents and solve the problem of "invisible, ina hearing" in transit.

Xiaofan Lin analyzed and studied the application of "Beidou +" vehicular 4G (5g) video monitoring system in the transportation industry[1]. Feng Zhu and Fangping Xiao built an integrated vehicle intelligent management and monitoring platform by using Beidou / GPS satellite positioning technology, geographic information technology and video monitoring technology, combined with the construction requirements of urban traffic information platform[2]. According to the actual situation of urban public transport system, Liang Xue and Xiaoling Liu established the public transport intelligent dispatching and operation supervision information system[3]. Jianbai Zhu analyzed the construction of the quality supervision index system of urban public transport service[4]. At present, the research mainly focuses on the intelligent construction and operation management of public transportation, but the dynamic supervision of the driver of the operating vehicle is of great significance to the elimination of driving safety hazards. In this paper, under the background of this research, statistics and research are carried out by using the data of the 4G regulatory platform in the city of Zhuo, with a view to improving the safety of transportation.

2 ANALYSIS OF THE DATA OF FREIGHT COMPANIES

According to the freight records of each bus company in Jiaozuo from December to May, the number of qualified vehicles, the score of monitoring and evaluation items, and the vehicle alarm records of each company are recorded. among them, each company name does not write a specific name according to the confidentiality agreement, but uses letters instead.

According to the monthly average vehicle qualified rate of each bus company, table I is produced.

TABLE I. THE AVERAGE MONTHLY VEHICLE PASS RATE, MONTHLY AVERAGE SCORE AND MONTHLY AVERAGE ALARM RECORD OF EACH COMPANY

Name of enterprise	Average monthly pass rate	Average monthly score	Average monthly alarm record	Name of enterprise	Average monthly pass rate	Average monthly score	Average monthly alarm record
A	100%	94	5	I	98%	95	195
B	52%	91	18	J	97%	93	561
C	100%	95	5	K	100%	93	0

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D	95%	94	154	L	96%	93	2
E	96%	94	32	M	97%	93	76
F	100%	93	83	N	92%	93	1
G	94%	89	48	O	91%	94	139
H	99%	92	50	P	92%	93	230

3 CORRELATION ANALYSIS

Using SPSS software to analyze the monthly average qualified rate of vehicles, the monthly average score of monitoring and evaluation items, and the monthly average alarm record, to explore whether the three are related and have correlation. The calculation results are as shown in the bivariate Pearson test results shown in Table II below.

TABLE II. BIVARIATE PEARSON TEST RESULTS

Relevance				
		Average pass rate	Average score	Average alarm record
Average pass rate	Pearson correlation	1	.406	.104
	SIG. (double tail)		.119	.701
	Number of cases	16	16	16
Average score	Pearson correlation	.406	1	.081
	SIG. (double tail)	.119		.767
	Number of cases	16	16	16
Average alarm record	Pearson correlation	.104	.081	1
	SIG. (double tail)	.701	.767	
	Number of cases	16	16	16

The monthly average alarm record is not related to the monthly average score and the monthly average qualified rate sig (double tails) P > 0.701 > 0.05 and 0.767 > 0.05, indicating that there is no correlation between the monthly average alarm record and the monthly average score and the monthly average qualified rate.

4 CLUSTER ANALYSIS

According to the monthly average qualified rate of vehicles of each company, the monthly average score of monitoring and evaluation items and the monthly average alarm record, the K-means clustering analysis is carried out by using SPSS software. After two iterations of the data, the data center achieves convergence. The final clustering center and the number of cases in each cluster are shown in Table III and Table IV below.

TABLE III. FINAL CLUSTERING CENTERS

Final cluster center			
	clustering		
	1	2	3
Average pass rate	.93298656	0.939267729	0.970588235
Average score	92.500000	93.79166667	92.5

Average alarm record	29.121212	179.375	561.0333333

TABLE IV. THE NUMBER OF CLUSTERS IN EACH CLUSTER

Number of cases in each cluster		
clustering	1	11.000
	2	4.000
	3	1.000
effective		16.000
defect		.000

According to the classification results, the 16 bus companies A-P can be divided into three categories: A, B and C.

Category A: this kind of bus company 4G video surveillance project is running well, the monthly average vehicle pass rate is maintained at 93%, the monthly average score is 92.5, and the monthly average alarm record is 29.

Category A contains companies A, B, C, E, F, G, H, K, L, M, N.

Category B: the operation of 4G video surveillance projects of this kind of bus companies is average, with a monthly average qualified rate of 94%, a monthly average score of 94%, and a monthly average alarm record of 179.

Category B includes D, I, O and P companies.

Category C: the operation of 4G video surveillance projects of this kind of bus companies needs to be improved, with a monthly average qualified rate of 97%, a monthly average score of 92.5, and a monthly average alarm record of 561.

Category C includes J Company.

5 CLOSED LOOP DISPOSAL ANALYSIS

The company uses positioning platform, intelligent 4G monitoring, Internet distance education and other means to manage and control the problems that may exist in the process of vehicle operation, find out the hidden dangers of safety, control risks in time, and sum up experiences and lessons. through the company's humanized education of drivers and passengers, it is more targeted, effective and peer-to-peer learning.

Class A and Class B companies speed alarm within 50 times the same penalty measures: more than 10 times, each fine of 50 yuan, more than 30 times, each fine of 100 yuan. After more than 50 occasions, Category A companies were fined more, Category B companies were released from contracts, and Category C companies only saw interviews with drivers and there were no clear rules on how to punish them.

As for fatigue driving, Class A companies are strict with Class B: class A companies impose an additional fine of 50 yuan for each fatigue driving, and Class B companies give verbal warnings to their insiders three times; for 4-10 times, a fine of 100 yuan is imposed; for 11-20 times, a fine of 200 yuan is imposed; and for more than 20 times, a fine of 500 yuan is imposed to stop work and receive safety education and training.

And Category A companies have good incentives: praise and reward drivers who score the top three per month or 12 months without a record of violations. And A-class companies have a good corporate culture, adhere to one-on-one, family visit warning education services, the typical educational significance of driver driving vehicle pictures, videos released in the group, accurate education warning.

6 CONCLUSION

Based on the data, this paper analyzes the relationship among the monthly qualified rate of vehicles, the score of monitoring and evaluation items and alarm records, and discusses the closed-loop disposal and company policy of well-run 4G video surveillance projects. In the future, the vehicle 4G video surveillance system will usher in a broader space for market development and technological innovation. I hope this paper can be used as a reference for further exploration in the future.

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