

Online Car Illegal Behavior Identification and Law Enforcement and Forensics Methods based on Big Data Technology

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Abstract: With the rapid development of social economy, people's living standards gradually improve, the online car in meeting the demand for convenient travel, at the same time, has become an indispensable means of transportation for the people's travel. In the face of the increasingly huge data information in traffic law enforcement, the traditional forensic measures for the identification of illegal behaviors and law enforcement methods of Internet dating cars can no longer adapt to the needs of the reform and development of traffic and transportation law enforcement. Therefore, how to quickly and efficiently identify the illegal behavior of online car and optimize the law enforcement forensic measures has become a new problem that law enforcement officers need to face nowadays. In order to solve the above problems, this paper firstly understands the current online car identification and law enforcement methods, then, analyzes its problems and drawbacks, and finally, combines the actual law enforcement work to put forward a few solutions and future law enforcement suggestions. Expect to be able to effectively solve the deficiencies in the identification of illegal online car and law enforcement methods of forensic measures to promote the better development of online car.

Keywords: Big Data; Online Vehicles; Illegal Identification.

1. Introduction

In 2015, Premier Li Keqiang put forward the "Internet+" action plan for the first time in his government report, the essence of which is to optimize the integration of various factors needed by the Internet in the production process and promote the further transformation and upgrading of traditional industries. The emergence of internet reservation rental car (hereinafter referred to as "online vehicles") is the most representative embodiment of "Internet + transportation" [1]. Compared with the traditional cruising cabs, which are difficult to get a taxi and have low public satisfaction, the online vehicles booking has greatly improved the convenience of people's travel and met their personalized travel needs, and has become an indispensable mode of transportation for the people, gradually occupying a larger market share [2].

The development of online vehicles has played an important role in driving forward urban social activities, promoting economic growth and securing social employment, but also brought about difficulties in industry governance [3] [4]. The data information in traffic law enforcement is getting more and more huge, the efficiency of law enforcement is getting lower and lower, and the traditional means for the identification of illegal behavior of online vehicles and law enforcement forensics can no longer adapt to the needs of transportation law enforcement reform and development. In the face of the massive data and information resources of online vehicles orders, how to quickly and efficiently identify online vehicles violations and optimize law enforcement forensic initiatives has become a new era problem that law enforcement officers need to face urgently [5].

In the era of big data, the concept of big data law enforcement supervision is established, and the identification

of illegal behaviors of online vehicles and law enforcement forensics are changed from "business driven "to" data prediction". Traffic law enforcement officers quickly extract the core information from the complicated format of online vehicles data, conduct data analysis of online vehicle violations, research and improve the identification of online vehicles violations and take corresponding measures in advance, which plays a boosting role in investigating and dealing with online vehicles violations in an efficient, scientific and accurate manner. At the same time, according to the evaluation of big data, law enforcement departments can be more scientifically and reasonably equipped with law enforcement forces and improve the effectiveness of law enforcement.

Big data technology can be prominently applied in the identification of illegal behavior of online vehicles as well as law enforcement forensics, which is of great importance to solve the problem of investigating and dealing with illegal behavior of online vehicles.

2. Current Frontline Law Enforcement on Illegal Online Vehicles Identification and Enforcement Methods

2.1. Enforcement Basis

In early 2015, the Ministry of Transport (MOT) first took a position acknowledging the positive significance of online vehicles, and on October 10, issued the Interim Measures for the Management of Networked Reservation Rental Car Operation Services (Draft for Public Comments). In July 2016, the State Council issued the Guiding Opinions on Deepening Reform and Promoting the Healthy Development of the Rental Car Industry (Guo Ban Fa [2016] No. 58), and the

Ministry of Transport, the Ministry of Industry and Information Technology, the Ministry of Public Security, Ministry of Commerce, State Administration for Industry and Commerce, State General Administration of Quality Supervision, Inspection and Quarantine and State Internet Information Office, and seven other ministries and commissions jointly issued the Interim Measures for the Management of Network Booking Rental Car Operation Services (Ministry of Transport and Seven Other Ministries and Commissions Order No. 60 of 2016). The legal status of online vehicles was clarified, and the operation and service behavior of online vehicles were regulated, pointing out that provinces and municipalities should formulate corresponding reform opinions and implementation rules in accordance with their own realities, and 247 cities across the country have successively issued specific implementation rules. 146th executive meeting of Chongqing Municipal People's Government on November 4, 2016 adopted the Interim Measures for the Management of Networked Booking Rental Car Operation and Service in Chongqing Municipality. On November 25, 2021, the Chongqing Road Transportation Management Regulations were adopted by the Standing Committee of the Fifth Chongqing Municipal People's Congress at its 29th meeting and came into effect on January 1, 2022. It will come into effect on January 1, 2022. It is clear that although there are different modes of operation between network booking rental car passenger transport and cruising rental car passenger transport, they all belong to rental car passenger transport, further regulating the operation and service behavior of network vehicles, and also making corresponding provisions for online vehicles platform companies.

2.2. Traditional Identification and Enforcement Methods for Illegal Online Vehicles

Under the guidance of the current online vehicles management methods, China's large and medium sized cities have initially built a reasonable network reservation rental car layout, and the three regions of Beijing, Shanghai and Guangzhou have accumulated advanced experience in the regulation of online vehicles on an early and pilot basis, mainly through the identification of driver personnel information, online vehicles information identification and online vehicles insurance information and other aspects of the establishment of information databases, so as to accurately identify illegal online vehicles information.

Chongqing traffic law enforcement departments on the illegal behavior of the online vehicle's identification and enforcement and evidence collection methods are mainly:

- 1) Front line law enforcement officers visually identify, intercept and collect evidence through inspection.
- 2) Establishing a 24-hour reporting line to receive reports on illegal operation of net-approved vehicles, and

arranging manning to combat illegal operation in crowded areas where the problems of the public are concentrated;

- 3) Law enforcement system to spot check the information of orders dispatched by the net-approved car platform;
- 4) Query suspected illegal online vehicle owner information and the driver information shown in the order comparison;
- 5) And transport management pass to compare the vehicle and personnel whether to license information. After notifying the vehicle owner or the driver shown in the order to the designated place to accept the investigation.

2.3. Using Big Data to Identify and Enforce Forensics on Illegal Online Vehicles

Since 2017, the Chongqing Transportation Comprehensive Administrative Law Enforcement Team proposed the plan of "Science and Technology", the team and the detachment have invested some manpower and material resources in the construction of science and technology law enforcement, and built a big data system with a relatively complete structure. At present, the command room of Yuzhong District Brigade has been completed and used, the command room of Jiangbei District Brigade is under construction, and bayonet equipment has been installed in Yuzhong District, Banan District, Shapingba District, Beibei District, Gaoxin District and Nanan District Brigade. Law enforcement forensic reference elements are applied, basically realizing the intelligent management of online vehicles with history of illegal behavior and suspected illegal online vehicles.

3. Problems with the Current Approach

3.1. The Current Situation of Online Dating

With the arrival of online vehicles in Chongqing in 2018, and then into the booming development period, according to statistics, the number of online vehicles companies in Chongqing has grown to 46, the total number of online vehicles as well as the growth rate are increasing year by year, at the same time, the number of non-compliant online vehicles is also very large.

The total number of online vehicles is increasing day by day, and factors such as unlicensed vehicles, unlicensed drivers, background verification, and complaint handling are gradually increasing in the proportion of illegal behavior of online vehicles. And the online vehicles platform chaos, platform construction without uniform standards, malicious competition to seize the market phenomenon is ubiquitous, industry authorities on the online vehicles platform behavior is difficult to control, these are to the online vehicles illegal behavior investigation and punishment and traditional law enforcement methods have brought a huge impact.

Table 1. Statistics on the number of online vehicles in Chongqing

Years	Number of online vehicles		Growth rate (online vehicles)		Number of cabs
	Compliance	Non-compliance	Compliance	Non-compliance	
2018	29560	71606	—	—	12,356
2019	50,577	131657	71.10%	83.86%	12,825
2020	57,147	98442	12.99%	25.23%	13,365
2021	60,821	137981	6.43%	40.16%	15,828

3.2. The Disadvantages of Traditional Law Enforcement

With the development and increase of the number of online vehicles business, some traditional law enforcement methods have obvious drawbacks and difficult law enforcement problems, mainly reflected in:

- 1) During the period of proliferation of online vehicles, "black cars" have been transferred from above ground to underground, and have been transferred from shouting for customers to taking orders online, so it is difficult to effectively investigate and deal with illegal operation in the traditional patrol type law enforcement duty mode in daily work;
- 2) Weekday morning and evening peak is the peak time for illegal operation, and also the most congested period of urban traffic, if law enforcement officers investigate and deal with it on site, it will definitely make the traffic more congested, and will also cause conflicts with the public;
- 3) Some places where illegal online vehicles gather are mostly located in the core urban areas with narrow roads and many people, so if they encounter obstruction in law enforcement or encounter vehicles forcing their way through customs, it will easily cause major safety hazards and negative public opinion;
- 4) Low efficiency of law enforcement and low visual recognition rate of law enforcement officers, resulting in a waste of human and material resources.

3.3. Problems Faced by Big Data-based Enforcement Approach

3.3.1. Offsite Law Enforcement Forensics has a Greater Risk of Legal System

At present, the law enforcement brigades under the jurisdiction of the deployment of the chokepoint equipment, monitoring system is still relatively small, has not yet achieved full coverage, part of the region's regular law enforcement work still rely on the public security road chokepoint system to assist in the investigation of evidence, off site law enforcement forensics in the online vehicle violations, there is no high definition camera shot vehicle driver face data, law enforcement officers are difficult to determine the actual driver, and no vehicle trajectory support, which makes Law enforcement evidence and complaint handling process is very tricky, there is a greater risk of legal system.

3.3.2. The Level of Operational Use of Law Enforcement Data is not High

Due to the complexity and variability of net-approved car violations and the complexity and specificity of the law enforcement environment, although the law enforcement early warning system has been established with the help of big data and other related technologies, the whole process of law enforcement is data based, basically realizing closed loop management, which provides a guarantee for the realization of lawful governance of net-approved car violations. However, due to the lack of necessary information sharing mechanism, many data information feedback speed is slow, for the online vehicle violations of law enforcement information resources cannot effectively interact, data play a discounted utility, law enforcement forensics full record,

traceability is not good enough, there are still more loopholes, the technical aspects still need continuous improvement.

3.3.3. The Intelligent Level of Net-Approved Car Information Platform is Low, and There are Risks in Transportation and Safety

At present, Chongqing has built and used the net-approved car information platform is not perfect, most of the functions are simple and single, the level of intelligence still needs to be improved, especially in the net-approved car illegal behavior identification technology, the level of intelligence is low, there is a delay in the update of data on the platform, law enforcement departments on the platform company data upload timeliness, accuracy still lacks effective regulatory measures, platform data interaction, data flow, data analysis still has quality differences, operation and security risk, There are also quality differences in data analysis, and there are still risks in operation and security.

4. Solution Ideas and Countermeasures

In view of the identification of illegal behavior and law enforcement forensics in the era of big data, the following solutions and countermeasures as well as future law enforcement recommendations are proposed in conjunction with the actual law enforcement work:

4.1. Traffic Vision Big Data Recognition Method

4.1.1. Surveillance and Control

The most important function brought about by the adoption of big data intelligent law enforcement is the ability to continuously monitor and control a large range at a low cost. The law enforcement monitoring system collects, transmits and saves the data within a certain range, so that it can accurately, timely and effectively understand the information about the behavior of online vehicles, and quickly feed back to the law enforcement department;

4.1.2. Individual Identification

Big data technology era for the identification of illegal behavior is to be able to accurately and quickly identify the illegal or imminent illegal online vehicles and drivers, under the monitoring of high-definition camera equipment, through the identification of the individual, uploaded to a large database, and then through the algorithm comparison, and finally accurately determine the information of the perpetrator, to achieve accurate law enforcement, perfect evidence.

By identifying the traffic visual big data, each law enforcement brigade currently has access to the following information:

- 1) Targets in motion.
- 2) Vehicle. Various information related to the online vehicle, such as license plate, appearance, travel track, etc.
- 3) People. Contains the location and characteristics of human faces, gender and body characteristics.
- 4) Objects. Mainly includes: placement position, object characteristics, types, attributions and other big data monitoring.

4.2. Use of Big Data Technology to Strengthen the Qualification Audit

Based on big data technology, relevant departments should strengthen the registration audit of net-approved vehicles,

especially the transport management department and the public security traffic management department should establish a linkage mechanism for information review, and the application vehicle information should be compared with vehicle registration information and owner information in the registration process, so as to eliminate false registration loopholes such as set vehicles. The use of positioning system in the prior review of net-contracted vehicles, the operation of non-compliant net-contracted vehicles to give punishment, the use of administrative penalties and other means to maintain the orderly development of the net-contracted vehicle market. For the stock of online vehicles, the relevant departments should also adopt random checks and other means to clean up vehicles that do not meet the requirements and to deal with online vehicles platforms that allow non-compliance. Relevant departments should make full use of big data, the Internet and other advanced technologies, data sorting of the information in possession of the online vehicles, strengthen the online vehicles beforehand supervision, do a good job in handling, after the remedial approach, improve law enforcement supervision, and maximize the control of unqualified online vehicles involved in operations.

4.3. Use Big Data Technology to Maximize the Efficiency of Law Enforcement

Fully implement the construction and use of the command room of the law enforcement brigade, promote the combination of onsite law enforcement and off site law enforcement duty mode, law enforcement officers grouped law enforcement, part of the officers in the command room law enforcement system to screen suspected illegal online vehicles, recorded into the suspected vehicle information database, through the main urban areas of each road section of the bayonet system for road precision screening, through the bayonet system over the car data statistics, the daily traffic volume of each period of time to analyze, for according to the analysis, another part of the staff can choose the time and place where the alarm is relatively concentrated to conduct accurate vehicle interception and investigation and evidence collection, and quickly conduct on site forensics on the actual driver and rider at the scene, which facilitates the formation of a closed loop of evidence, with high law enforcement efficiency and strong deterrent effect on illegal online vehicles.

4.4. Use of Big Data Technology to Improve the Efficiency of Deployment and Control

Law enforcement officers through the video system real time view of the situation in major business districts, the use of big data technology to focus on the cab stand, the online vehicles drop off and pick up locations, illegal operation gathering place, to understand the major business district transport market order, with special attention to the peak commuting period, peak tourist travel time travel locations. The law enforcement brigade can use video surveillance to take pictures of the camera and archive them to improve the efficiency of identifying illegal behavior of transportation vehicles such as online vehicles and cabs.

Law enforcement officers through the bayonet system analysis of long term access to the major business districts and peak tourist travel locations of the online vehicles information, the brigade can enter the region for a long time as a key regulatory vehicles into the bayonet fabric control alarm; frequent passage of highway vehicles for screening,

screening some key vehicles into the bayonet fabric control alarm, to achieve precise investigation and punishment, to enhance law enforcement deterrent force.

5. Conclusion

With the development of social economy, science and technology and the promotion of traffic law enforcement information, under the influence of big data, traffic law enforcement will be more closely integrated with big data, further improve the big data system for transportation law enforcement supervision, conduct comprehensive analysis and application of big data, and the use of big data technology makes traffic law enforcement work more intelligent.

Under the technical support of big data, Chongqing net-approved vehicle law enforcement faces new opportunities and challenges, and should develop effective countermeasures and solutions to the various shortcomings and problems in the current net-approved vehicle law enforcement management as soon as possible, cultivate and strengthen the awareness and ability of traffic law enforcement officers in science and technology law enforcement, further use big data technology to strengthen the identification of net-approved vehicle violations and law enforcement forensics, and raise the law enforcement ability to a higher level. At the same time, in the future, law enforcement officers can be organized to regularly go to the jurisdictional net-approved vehicle platform, rental car enterprises, key regional net-approved vehicle gathering point to the management and practitioners of relevant laws and regulations, quality of service, for the operation of net-approved vehicle companies and net-approved vehicle operation of illegal, prone to behavior for special delivery of legal answers to enhance the legal awareness of practitioners, the establishment of a rewarding reporting mechanism, play the role of mass supervision, and eliminate illegal behavior of online vehicle from the source.

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