

Research of Police Big Data for Public Security

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Abstract: With the application of big data, the traditional work methods have been incompetent in the complex and changeable social situation. Police big data means an integration of the industry data, police data and Internet data, it uses advanced analysis technology and establishing innovative application to improve the working efficiency so that we can combat and prevent crime better. Police data can be classified according to different criteria, but they also can be brought together into a general model. At present, police big data has got remarkable achievement in defining 'crime hotspots' and anti-terrorism work and so on. Although there are still a lot of challenges, the innovative application of police big data has become the new trend of public security in the future.

Keywords: police big data, integration, innovative application, public security

1. INTRODUCTION

It has been found that integration with big data will bring new opportunity of development for any field, for example, it can provide more effective decision-making for merchants and more excellent service for customers with a combination of business and big data, financial risks can be identified effectively and prevented by applying financial big data even it can be controlled and optimized for the operation process [1], Combining with education, we can realize individualized teaching for every student and assist teachers to optimize the teaching method, clinical decision support systems can become more intelligent and carry out comprehensive epidemic monitoring [2] if it combined with medical big data.

The implication of police big data is combination police work and technique of big data, that is to say, making effective use of the data from many sources can increase police work productivity. They are the responsibilities of policemen that to maintain the order of the production, to protect State property, to secure the private data, to guarantee personal safety and legitimate rights, and also to crack down on illegal and criminal behavior. The close integration of police work and big data from all business is probably what keeps a productive

schedule. As a result, it is a powerful means for policemen to enhance combatant effectiveness that to apply the data-driven policing management.

Applications of police big data is to establish regular communication and exchange of information resources, it is a security mechanism which accessing the data from all social domains and sharing them to deduce clues. We can not only predict crime trends but also implement efficient scheduling command and security patrol by mining and analyzing such data.

In this paper, the second part summarizes the classification of police big data such as source of police big data, the third part puts forward the model of big data application divided into four levels that is data acquisition, processing, analysis and application. The fourth part lists the current applications of police big data such as hot spot, the fifth part analyze the drawback of police big data and then summarizes the article.

2. CLASSIFICATION OF POLICE BIG DATA

It contains large amount of data in policing work such as from business, finance, telecommunications, education, medical treatment, diversity, in addition, it also includes all of data that is collected from daily work, such as population, transportation, case and public opinion and information on the Internet, the data may be text, pictures, audio, video, etc. We can divide them according to different criteria for classification.

2.1 Classification by sources

With the development of the information, many information management systems about population, illegal crime personnel, stolen vehicles, exit-entry administration, transport management and so on have been established that almost contain all police work data. Also we can access data from other industry database or Internet. Now, it is the most important source we access data, in addition, other industry database and public information on the Internet are also one of important source of police big data.

2.2 Classification by ways to acquire data

Police big data can be divided into explicit data which is accessed directly not to be calculated or analyzed and implicit data which needs to be obtained by means of filtering, analysis, observation or statistics according to the classification of access. For example, if the record stored in the data table is explicit data, then these records such as total, average, maximum and minimum are implicit data. So what the witness say is explicit data, but his personal traits such as expression and emotion are implicit data. Whether explicit or implicit data, are very important sources of data for applications of police big data, usually explicit data is direct clues or evidence of case, and analysis of the implicit data needs certain plays a indirect clues or

indirect evidence in case.

2.3 Classification by storage form

When it comes to the storage form, police big data includes structured data, unstructured data and semi-structured data. It is simpler to be analyzed for structured data which stored in the database because of its unified structure or similar format. However, such as documents, images, audio and video files, they are unstructured data which can not be expressed as unified structure and it is so difficult to process them. Between structured and unstructured is semi-structured data which mixed with different forms and it is also difficult to deal with them.

3. APPLICATION MODEL OF POLICE BIG DATA

There are a lot of important state secrets and personal privacy in police big data that can not be made public because of security law, therefore, we must develop our own technology and application. Based on the characteristics of big data and advantages of police work, it is suggested that the conceptual applications model of police big data should contain four layers, are shown in Fig. 1 below.

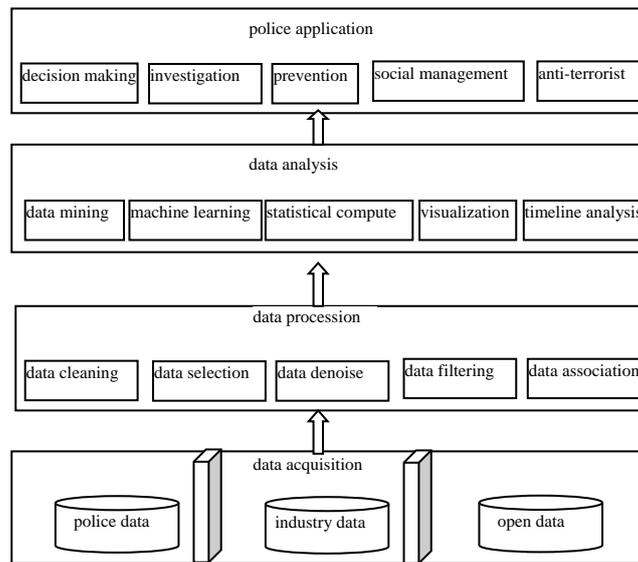


Fig. 1 Application model of police big data

3.1 Data acquisition layer

The data acquisition layer is the source and foundation for construction of police big data, which can realize the function of obtaining data from different fields or structures or storage modes, and process data from all sources of police big data as far as possible. This layer

guarantees quality of data, it does everything to ensure that the data accessed is comprehensive and accurate, also ensure that is secure. Because of the specificity of police work it is segregated on infrastructure from other information system, also police big data usually contains a large number of important industry privacy data, how to share securely the data from different resources is the most important assignment of data acquisition layer.

3.2 Data processing layer

The task of data processing layer is mainly to handle properly all the data derived from different types of databases, Including cleaning, filtering, denoising, associations for all kinds of data collected early and so on. Filtering algorithm that is used to select important data to establish record set which has unified structure, the computer can query and access the data with great rapidity because of their same format. In addition, we should focus on the selection of hotspot such as national security, social stability for higher efficiency and less time.

3.3 Data analysis layer

The data analysis layer is the core part of the application model because we can discover the great value of the data only in the analysis stage. After cleaned and classified the data is stored to prepare for the next analysis and treatment according to different application requirements for data processing, The common methods of data analysis are data mining, machine learning, statistical computing, visualization, time line analysis, etc. In addition to the traditional analysis method, we also apply the technology of cloud computing for the in-depth analysis which is the method especially for big data.

Data mining is a technology for automatic analysis of big data through specific computer algorithms to obtain hidden relationships, patterns, or trends between data, providing support for decision making, while data analysis can be used to further customize the cleaning data and to find its value.

3.4 The application layer

The task of police work includes intelligence study, command, criminal investigation, public security prevention and control, social management, anti-terror work, standardize law enforcement and other business, it is provided an interfaces of the application layer for each business to use the conclusion of police big data analysis , improving work ability and service level.

Depending on the application layer, police big data plays a tremendous role and fulfills upon police word using data only, for example, we can obtain combat effectiveness, decisions and service ability from police big data, and make the data become the leading force to accelerate the development of police work.

4. TYPICAL APPLICATION OF POLICE DATA

Although applications of police big data is still in its infancy, and many technology is still in research to further development, there have been some typical cases that applied in our world and has achieved remarkable success, below are some samples of typical application of police big data.

4.1 Forecast of crime hot-spots

According to Barak Brazil's view that people are creatures of habit, so we can predict human behavior up to 93% on average, especially for some person with regular habits it can reach even 100%, also the incident has its inherent characteristics for that explosion theory may explain in a certain degree. So that it is feasible to get prediction using police big data [3].

At present the prediction application of police has been adopted in more and more countries such as United States and Chicago police is a typical case, they located successfully the hot-spots where possible criminal lived depending on the risk analysis of police big data, then took real-time monitoring to them and prevented the occurrence of crime according to the results of the analysis [4].

After George Mohler had designed an algorithm to predict the hot-spots where thefts would happen, using this model Santa Cruz police achieved to reduce the theft crime by 27 percent against the same period in previous years. In Charlotte of North Carolina, police have compiled a map of high-risk areas that could be attacked by a criminal through the analysis of home mortgage data as a reference to police work.

4.2 Fight against terrorism

There are some traces of plan and implement activities before Social contradictions or terrorist incidents happen, such as communications, finance, medical treatment, traffic data, we should make full use of police big data to prevent them with mathematical algorithms and find those persons whose actions accord with specific terrorist behavior model. It is achievable to detect the trend of terrorism and prevent it in time with scientific predictions of social situation.

One of the first application of counter-terrorism big data is in the United States, the Patriot Act in 2001 and Homeland Security Act in 2002 involve the content of using big data to stand up to terrorism. After 2008 Mumbai terrorist attack the U.S. government established a national plan named intelligence grid, and studied the intelligence big data of law enforcement agencies helping to tail after suspects and prevent terrorist attacks.

In August 2011, the New York police department developed a system named DAS based on crime prevention and anti-terrorism technology of big data, it can analyze a large number of camera videos, call records, license plate numbers, sensor data and criminal records to determine the suspect and reveal the criminal pattern by tracking vehicles and specific

communication records.

4.3 Look for clues of criminal

It has changed fundamentally in investigation mode because of police big data that is used to improve investigation capability, so to speak, it is the developing direction of future police work. In practical use the police investigation urgently needs to retrieve data form other region or department for clues and provides guarantee for decision-making with comprehensive and accurate data.

For example, if someone calls frequently the suspect also takes same public transit with him and lives in the same hotel, from that we can conclude that they are probably the accomplices. In the traditional activities of investigation, it will cost several hours or even days to prove that two persons are friends by analyzing different clues that may be inquired from multiple data sources. Relatively, it may take even several seconds with the technical support of big data application based on the analysis of fusion and automatic, at the same time we can also describe all social relations of the suspect in visual way.

4.4 Better service for people

We can obtain real-time dynamic information and more accurate understanding of people's demand through big data, it is very important to enhance the management level of police and to promote the standard of service.

With the integration of relevant data of police big data, we can strengthen our business capacity and improve our working effect or service functions. The technologies such as machine learning, visualization and data sharing that included in the police big data, can achieve intelligent analysis and improve the efficiency of the security management, furthermore, it is more important to accurately understand and grasp the needs and behaviors of people so as to realize people-oriented management.

5. CONCLUSION

The ultimate aim of police big data is preventing and combat crime so as to maintain social order, we can improve the correctness of decision-making with the technology of big data and analyze scientifically the known even unknown law of things to scientific to avoid errors caused by subjective.

Although police big data brings us new development for improving the capability of policing work, it also creates some challenges for our work. For example, it is variable and inaccurate inevitably for the forecast only based on the current state of data because they are dynamic things that change repeatedly. Police big data integrate resources around the world as one, so

large cultural distance and different forms of expression for same thing also can be reflected in the digital world.

A large number of facts indicate that big data collection often involves personal privacy including location, personal identification, status and interest, and habits, etc., if not handled properly, it can invade the people's legal rights. No matter how large the data is, there are still "dark zones" of big data sets, which means that big data sets still have incomplete flaws.

Applications of police big data are still in the initial stage, and it still needs a lot of exploration and practice in the future. It is probably the future direction of development of police big data that carrying out business application based on geographic information and the clue of time to establish a unified system of spatial structure.

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