

Introduction to the Predictive Policing of the United States and its Enlightenment to China

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Abstract: The impact of big data on policing is multifaceted, which is especially evident for intelligence. At the same time, crime has also become characterized by diversification, virtualization, and organization. After the United States developed the policing model of COMPSTAT in the 1990s, people realized the importance of intelligence-led for predictive policing, and subsequently developed a large number of software and methods to support crime prediction. In 2013, the RAND report made a detailed explanation of the US criminal intelligence forecasting model. In recent years, China's big data development ranks among the top in the world. However, due to the relative gaps and technical limitations of the police model, we can not combine both successfully. Drawing on the successful experience of the United States, China must not only draw on the experience of the professional analysis and forecasting team, integrate big data into police work, and construct criminal intelligence forecasting systems, but also pay attention to the actual national conditions.

1. Introduction

The theme of the fourth police revolution is crime prevention with the participation of the whole society. The premise of crime prevention is to master relevant laws of crime and deploy relevant resources according to relevant laws and future development and changes, so as to work effectively and efficiently. Nowadays, with the rapid development of the Internet, not only is crime prediction limited to offline methods, but to follow the trend with computer technology to realize multi-level and wide-field prediction of crimes by collecting all kinds of data. When *Global Science* of the United States elaborated the development trend of modern police service, it was described as follows: "Predictive policing is on the rise around the world, and it will certainly become an important means to reduce the occurrence of crimes and carry out security prevention."

For many reasons, China started late in crime prediction. From 2000 until now, the intelligence-led policing concept has only developed for only twenty years in China and the predictive policing mode developed slowly. By other's faults, wise men correct their own. The United States has been developed and innovated police forecasting modes on the rise of the Compstat mode since the 1990s. As police exchanges between the two countries, by learning from the multi-dimensional and comprehensive development of American predictive policing mode, and their experience in the use of technology, personnel training, and moral philosophy, the paper is to put forward the predictive policing mode with Chinese features, to build a crime prediction system, and to achieve the development of predictive policing while abiding by the law and protecting the legitimate rights and interests of citizens.

2. The model and system of American police forecasting

In Rand Corporation's 2013 report on predictive policing in the United States, it pointed out that the police forecasting mode in the United States is an applied analysis technique, or even a quantitative analysis technique. It can predict potential targets for police intervention, as well as prevent crime or solve existing crimes by data statistics. [1] The accuracy of police forecasting relies on high-quality data sets. Only after scientific sorting, evaluation and analysis can the large amount of information entered in daily functional work become a useful data set. Therefore, the analysis tools of predictive policing supported by big data can provide effective intelligence products for senior decision-making process.

2.1 Construction and Effectiveness of Policing Predictive Software

Predpol, which focuses on the analysis of geographical location, familiarizes itself with local crime patterns by the time, places and types of crimes. The software automatically maps high-risk areas. So the leadership simply assigns the police to patrol red-flagged areas. Relying on the officers' own professional competence and experience, the crime rate can be greatly reduced in the city without increasing the human resources budget. When Predpol was introduced to police stations in some cities, it worked successfully.

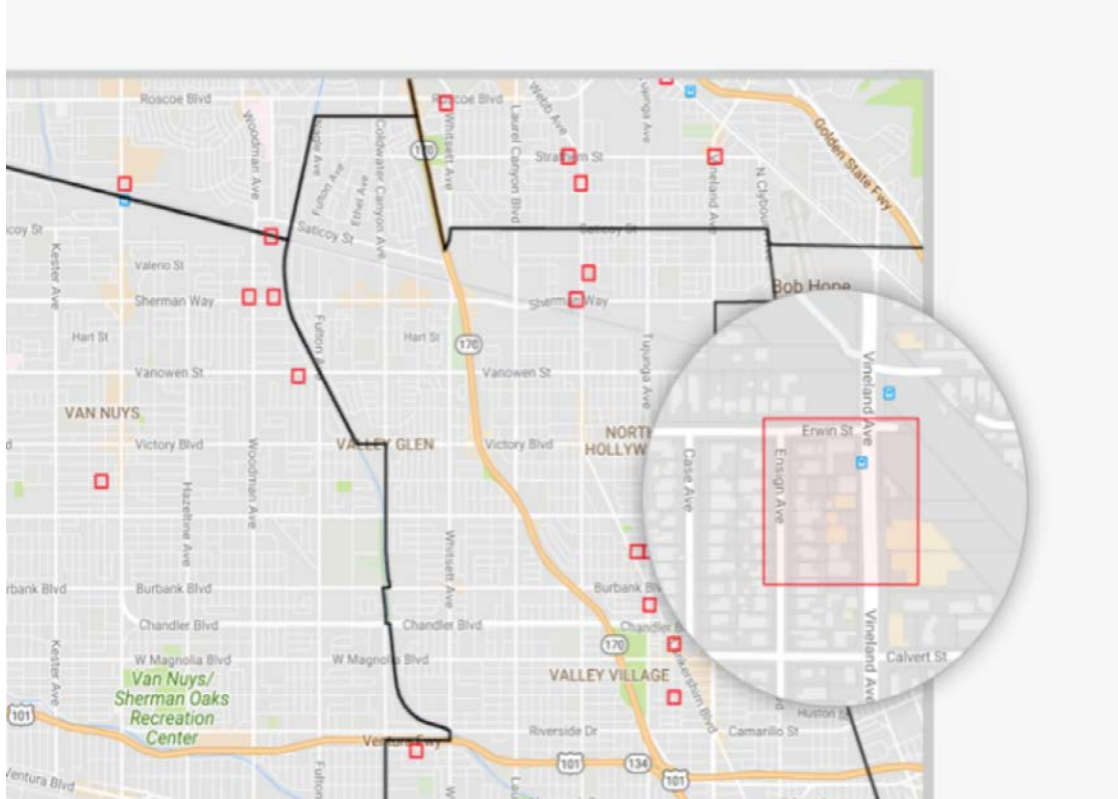


Fig.1 The Predictive Picture of Predpol Software

IBM, Crime Insight and Prevention. IBM can provide policing data integration, policing big data analysis and policing big data visualization based on its mature technologies -- Cognos Business Analysis, SPSS Predictive Analysis and Spot On and ESRI Mapping. [2] IBM's prediction and prevention of crime analysis technology allows the organization to take full advantage of their human and information resources, and to monitor, forecast and detect the crime trends, to analysis the police data, to provide decision planning supported by data, to track criminal activity, to assess the crime possibility, to deploy resources effectively and to quickly handle the case.

In addition to these platforms, Blue Crush Crime Analytics in Memphis and DAS in New York all provide accurate crime predictions for the police.

2.2 Work Steps of American Predictive Policing

The first step is the collection of crime data. All forecasting techniques rely on data, and the quantity and quality of the data will determine the accuracy of the predicted results. The second step is the analysis of the problem. In the analysis of crime data, the analyst realizes the evidence-based analysis and prediction by the professional analysis techniques. The third one is police action. If the results of the analysis cannot be carried out in the police department, then the best analysis will not reduce the crime rate. Action should also be continuously evaluated to test the effect of action. The fourth one is crime response. After the police implement intervention measures, potential criminals may choose to change the location of the crime or change the way they commit the crime according to the police action. In this case, criminal activity will move to another area. Much of the data is out of date because of these changes. It's time to start a new cycle of data collection, analysis and intervention. [3]

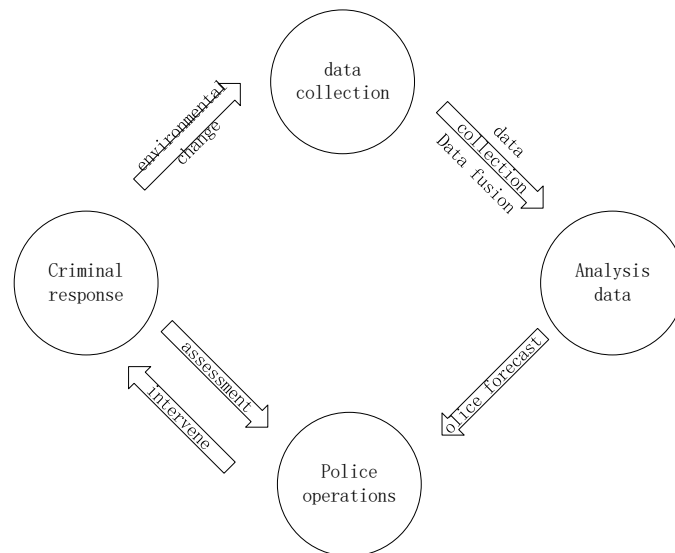


Fig.2 Flow Chart of American Predictive Policing

2.3 Forecasting policing method of the United States based on big data

Hot spot analysis method: according to the historical crime data of a certain region, the future criminal trend of this region is determined. This method is based on the fact that the crime does not occur evenly in each area, to identify the areas with the highest or higher crime rate as its hot spots.

Regression method: regression method is a mathematical relationship between variables. Compared with the hot spot method, regression prediction of future crime risk is not only based on past crimes, but also based on what kind of data can be used as the basis of prediction. Statistical regression has been widely used in crime related problems. Near repeated method: this method assumes that some high-risk areas and high-risk crime time periods in the future are very close to the current high-risk time and areas. The area with high crime rate is likely to produce higher crime hot spots in the future.

Time space analysis: there will always be time and space differences in the characteristics of crime. The space-time analysis method is to analyze the relationship between crime, time and environment. The purpose of this method is to predict the location and time of future crime by using the information and the related time of crime.

The above methods are widely used in the United States and have been tested in actual combat, and provide a solid technical support for the prediction of policing mode in the United States.

2.4 The innovation and development of American forecast policing mode

In the traditional crime analysis mode, we mainly make empirical prediction. It relies on the police officers' habitual knowledge formed in the long-term investigation and case solving, with more perceptual elements and less rational basis. This method is mainly based on two aspects, one is historical experience, the other is the analysis of various factors. The data supported by the pattern has the disadvantages of small capacity, low authenticity and slow update. Obviously, the forecast policing model of the United States is formed and developed on the basis of overcoming the shortcomings of data.

2.4.1 Big data and artificial intelligence technology embedded in US predictive policing mode

The emergence and introduction of big data technology makes investigation activities not just like simultaneous interpreting but adorable police prevention. After screening and analyzing a large number of historical data in the past, big data technology obtains the key points of management and control to ensure that the investigation work is more targeted. The integration of big data is the key premise for the modern predictive policing mode to achieve transformative development. American police actively integrate artificial intelligence technology to realize the transformation of traditional investigation and case handling pattern. The police artificial intelligence system, which combines

the functions of crime tendency analysis and case characteristics research, makes police officers more efficient and intelligent in handling cases by actively collecting massive information and data and intelligently associating them. Artificial intelligence is also changing the patrol prevention and control mode of American police. The United States police deeply excavate the research and judgment value of massive data in an intelligent way. The intelligent patrol prevention and control mode with data intelligence as the core makes maximum use of the insufficient police resources in the United States, reduces the human cost and improves the accuracy.

2.4.2 Predicting the development of police affairs promotes the specialization of criminal analysis team

The professionals who perform crime analysis and the technologies they use are committed to helping police departments improve their efficiency through better information. The main body of criminal intelligence prediction and analysis in the United States is the professional criminal analysts who have mastered the technology of data statistics, data mining and crime mapping. The young, creative and master the technology of data statistics, data mining and crime mapping are more likely to stand out. The specialization and professionalization of Criminal Intelligence analysts has become an inevitable trend. [5] According to the American Association of crime analysts, the work of crime analysts is mainly composed of the following aspects: first, to find out the patterns, trends and hot spots of crime, and to find the same type of cases for investigation; second, to study and analyze the long-standing and repeated crime problems in this region; third, according to the needs of decision-making and grass-roots actual combat departments The fourth is to integrate the local intelligence and promote the development of intelligence work; the fifth is to improve the efficiency of the local police department. [6]

2.4.3 The Enlightenment of American predictive policing model to China

Compared with the early model of American predictive policing, China is still a little inferior in crime prediction and intelligence analysis, and its understanding of criminal law is still dominated by qualitative law, and there are still some defects in technology integration and concept establishment. In recent years, with the continuous increase of police exchanges, on the basis of maintaining the original characteristics of investigation, China has learned from some experiences and lessons of the United States on the basis of its own national conditions.

The current situation of China's crime prediction

The demand for crime prediction in China is urgent, so it develops rapidly. Since the introduction of the concept of "intelligence led policing" in China at the beginning of the 21st century, local public security organs have established the most practical police forecasting platform according to the local police situation.

But generally speaking, due to the late start, the research and application of forecasting policing in China is not deep enough. For example, in the training of professional police forecasting team, China has not yet established a complete training system, and there is no relevant laws and regulations to give full protection. Public security intelligence personnel is an important force in the development of China's predictive policing, and only fixed public security colleges and universities can train such professionals

3. The Future Direction in China

3.1 Set up a professional team of intelligence analysis and crime prediction.

After 9/11, the US intelligence community paid more and more attention to the analysis of criminal intelligence, which America's law-enforcement intelligence work vigorously now. American government, institutions of higher learning, law enforcement agencies, enterprises, professional associations, have made some great achievements in the cultivation and training of criminal intelligence analysis talents, and formed a form of talent cultivation with their own characteristics. [8] China can make efforts in the following aspects: First, relevant laws and regulations should be formulated to ensure that training is protected by law with a certain executive

force. Secondly, it is necessary to promote the diversification of training subjects, which should not be limited to government departments and police colleges and universities. Professional training institutions should be established, and corresponding disciplines should be set up in comprehensive universities to attract more students and strengthen the technical force of police forecasting. Third, establish a national professional analyst association, set testing standards, and provide authoritative certification for analysts who pass the test. Fourthly, a scientific and reasonable course system should be set up, and the training scheme should form an official recognition standard, and the subject knowledge should be updated in time to ensure the timeliness of training. Provide corresponding training courses to ensure that analysts have enough practical ability to deal with various illegal and criminal situations.

3.2 Develop crime prediction tools supported by big data

The basic functions of crime prediction tools should include hot spot analysis, high-risk personnel, vehicle track analysis, location analysis of potential crime, analysis and prediction of public security, etc. The tool can realize the collection, exploring and deep learning of data, and make continuous analysis to obtain the prediction law suitable for the region over a period of time. It should be noted that it is important to develop new crime prediction tools. But the most important is the practical application of the developed tools.

3.3 Problems in the Development of Predictive Policing

As an emerging technology, big data still has a lot of room for development. We should adopt a scientific and prudent attitude towards big data. It is an objective fact that things are unpredictable and the predictive policing based on big data has limitations. Any attempt to change this fact will not work. On the contrary, we should adopt a rational and objective attitude, accept the basic fact that the predictive policing based on big data has limitations, and we should adopt the strategy of "adapt instead of improvement" to re-understand and define the application of big data in the predictive policing.

First of all, it is impossible to directly judge the causal relationship through the crime prediction of big data. If we want to find the causal relationship, we still need a lot of manpower to analyze it.

Secondly, the crime prediction based on big data, to some extent, threatens individual privacy and personal freedom, which requires more efforts in data source and data protection. [10] The police also need to comply with privacy and data protection policy, precisely control over access to the personal data and security information, integrate a variety of ways to check the data accuracy, create real-time audit log function and establish a police data privacy protection platform. While protecting data from leaking, do not reduce the frequency of data in criminal investigation.

Finally, in the crime prediction research of big data, it is very easy to be "limited by research results" and "obsessed with data". [10] The application of big data in police work should follow the principle of rationality: it should be clearly recognized that the prediction accuracy of big data is also limited, and only by combining the prediction results of big data with our own rationality can we get the prediction products that best meet the actual requirements.

4. Conclusion

To promote the policy of governing the country by law, China should strive to make and improve laws and regulations, and at the same time, strengthen law enforcement to ensure the implementation of laws and regulations. On the basis of investigation and solving cases, how to realize the privacy protection of such data is also a mandatory requirement of the society for the police. As the age of big data, the police will undoubtedly become increasingly reliant on data for their resources and to process them effectively. [11] China's big data industry is developing rapidly, but there is still a gap in relevant legal protection, which requires the joint efforts of the government and relevant scholars to improve.

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