



Considerations on Predictive Policing Software

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Some media outlets reported on a recent case in Italy where a 55-year-old man was arrested before committing a crime [1] [2] [3]. The story gained attention because the Italian police used a crime-fighting software with “predictive technology” called “X-Law”.

The Naples Police's software is a computer program with algorithms that use a large amount of data to perform predictions based on probabilistic estimates. In similar software, the most common data used are the thieves' criminal records, the incidents' history in different regions of the city, the police force's location, the commercial establishments' working and operation hours, among others. From these data the program can indicate to the police the places with the highest probability of occurrence of crimes within a confidence interval.

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The use of software similar to “X-Law” is nothing new. PredPol [4] is a program with machine learning technology used by the Los Angeles police. Since it came into operation, the software received rave reviews but also criticisms [5] [6]. One of them concerns the possibility of “reinforcement loops”, which could make the program provide “biased” results to the police.

In system engineering [7] [8], a reinforcing loop is one in which an action produces a result that influences more of the same action, thus resulting in growth or decline rates. Loops can be either positive or negative. An example of a positive reinforcement loop is that of population growth: the larger the population of a country, the greater the increase in births; and the greater the number of births, the larger the population of a country. An example of a negative reinforcement loop is the predation relationship: the larger the number of predators in an area, the smaller the number of prey; and the smaller the number of prey, the smaller the number of predators; however, when the number of predators decreases, the number of prey will increase again (if they have not been extinct),

and the number of predators will also increase (if they have not died from starvation). For the sake of simplicity, the external factors influencing growth or decline rates were disregarded.

The fear of reinforcing loops is that the algorithm may always indicate the same criminals, or the same regions of the city, due to the number of past and recent occurrences recorded [9] [10]. Some of the consequences of such “biased” software behavior may be, for example, the inefficiency in identifying new offenders and new regions with criminality, or the risk that certain neighborhoods associated with particular ethnic or racial groups are unfairly labeled, leading to discrimination against their inhabitants.

Civil rights advocates warn that justifications for using this technology may be masking a major problem: ethnic and racial discrimination [9]. There are activists who argue that it is dangerous to completely withdraw the perspective and human interactions from the process of assessing who may or may not be considered a potential criminal. Machine learning algorithms provide responses based on their training and operation data, and if some type of bias is modeled or programmed in predictive policing software, even if unintentionally, the results can be very negative.

Technology should be employed as an ancillary tool in the fight against crime, but not as a source of absolute truth because the data supporting the programs may be incorrect. In 2016, during a database audit



of California police intelligence (AI) software, it was verified that the data consulted by judges about people alleged to have been linked to gangs was wrong [10]. Therefore, it is recommended that the human assessment capacity be not wholly abandoned and that suitable entities periodically audit the same software and its databases.

Probably, the predictive policing software adoption will increase, as it has been occurring in the United States, Canada, and other cities around the world. But caution is needed because in the predominantly Muslim city of Xinjiang, in China, a similar type of software has been used for some time and, unfortunately, there are reports of arbitrarily detained people with justifications based on the software's data [11]. There are even records that the citizens' data collected from images obtained from closed camera circuits, credit card transactions, telephones' and computers' Wi-Fi connections, health records, banking data, among others are used to repress residents [12].

The acquisition of open-source predictive policing software can be an alternative to try to prevent governments from using these kinds of software as repression tools, by avoiding the purchase of “black boxes” that do not allow the understanding of the system's internal functioning [13]. In AI software it is important that some characteristics exist, such as: transparency (possibility to consult and understand the AI decision-making models), explainability (possibility to understand the AI reasoning mechanisms), and probability (possibility to mathematically prove the results of each program decision). Some consulting firms have identified that the lack of trust in the AI decision-making software models is a business opportunity that will increase. Therefore, they offer services to assist in the evaluation of these software before purchase [14] [15].

Acquiring software based on international standards can also alleviate the problem of purchasing “black boxes”. ISO (International Organization for Standardization) is an entity that has been working on the creation of standards for the elaboration of AI systems [16] [17], such as ISO/IEC 23053 (for systems that use learning of machines) [18] and ISO/IEC 38507 (to standardize the use of artificial intelligence by organizations) [19]. Software that are developed and certified according to international standards have international recognition, as they must follow well-structured quality standards and public knowledge development and deployment processes, allowing greater interoperability, consistency, and transparency regarding the final product. Therefore, it is interesting that public entities consider acquiring AI software based on international standards to provide citizens with a degree of transparency that is credited by a qualified entity such as ISO.

Crime fighting is a need in most metropolises and big cities around the world, so it is possible that in the future new news on the following initiatives might appear: HunchLab [20]; CrimeRadar [21] [22] (Brazilian prototype used in the city of Rio de Janeiro during the 2016 Olympics); the CompStat [23] [24] [25] (which is not a software, but a set of technological tools and organizational methods working towards police departments), among others. The justification for using these software to fight crime is noble, but it is necessary that the population, the rulers, and especially the academics pay attention to the use and development of this type of technology, for although the immediate results are attractive it is still not precisely known what the consequences for society might be in the future.



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