


CRIME PREVENTION AND PREDICTIVE ANALYSIS: THE ITALIAN CASE

PREPARED BY
VIRGINIA CINELLI



Nowadays, two main limitations persist in intelligence analysis: the intrinsic existence of a certain degree of uncertainty and the large volume of information available. In order to face these problems, from the end of the 90s, technology and statistics have been used in the field of security to tackle the analytical limitations of human beings and improving their performances. As a result, professionals in crime prevention started using technology and specialised investigative programmes to calculate the probability that a (criminal) event might occur in the future - a phenomenon also known as “predictive analysis.”

The precursor to this technique is the Compstat software, which was developed in 1994 by the New York Police Department. Later, many other systems were implemented worldwide, including i2 Analyst Notebook (France), PredPol (United States and United Kingdom), Crime Anticipation System (Netherlands), Precobs (Germany) or Policy Cloud System (China).

In Italy, at least three software of this type have been tested. The first one, Delia® (Dynamic Evolving Learning Integrated Algorithm) was developed in 2007 by Mario Venturi - at that time Police Officer at the local Police in Milan - and aims to detect serial crimes by predicting where, when and how the next criminal act should take place.[1] In 2014, a collaboration between the Transcrime research centre of the Cattolica University of the Sacro Cuore in Milan, the University of Trento and the Italian Ministry of the Interior developed the Risk Terrain Modeling (RTM) predictive model - applied to the cities of Milan, Rome and Bari to increase the predictivity of home robberies (Dugato et al., 2015). Similarly, in December 2018, the local police in Naples tested X Law for the first time, a program to predict robberies (La Repubblica, 2019). So far, Delia® - which has been further developed thanks to an agreement between the creator Mario Venturi and IBM - seems to be the programme with highest potential on the Italian soil. An analysis follows below.

[1] At the very beginning, the software was called KeyCrime. Then, in February 2018, KeyCrime inventor Mario Venturi decided to set up a company called Keycrime S.r.l, took the lead of the software and further change its name to Delia® in 2020.

WHAT ARE THE BENEFITS OF DELIA®?

Delia® presents five main strengths. Firstly, the programme is **analytically complex** in terms of variables used and data processing. The software is, in fact, capable of processing up to 1.5 million variables, focusing on two types of data: simple and generic (e.g. time of criminal act, place, day, etc.) or sophisticated and detailed (characteristics and behaviour of the offender). Ultimately, it assesses four criminogenic elements: type of crime, objective, *modus operandi* (including objects, weapons, and means of transportation used) and the psycho-physical characteristics of the perpetrator (such as clothing, tattoos, piercings, scars, or any visible object that may identify him). Once all these elements have been collected, the data processing starts combining practices and tools extracted from disciplines such as mathematics, statistics, behavioural psychology, or geospatial analysis. The analysis includes two phases: an inductive one[1], in which a specific crime is analysed in detail in order to identify elements common to other crimes of similar characteristics and link them to a single offender; and a deductive one[2], where the results of the first analysis are used to predict when, where and how the future crime will be committed.

The second relevant element refers to the **interdependency** between the software and the analyst. In contrast to other predictive policing programmes, Delia® requires the analyst to take the final decision on every crime analysed by 'accepting', 'dismissing, or pointing out as 'probable' any similarity between two different crimes. This method has two benefits. Firstly, it reduces the margin of error of the software analysis by introducing an element of subjectivity and critical thinking into the decision-making process. This allows the analyst to maintain a certain extent of creativity and imagination while analysing the facts. Secondly, it prevents the loss of information, limiting the possibility that any variable inserted into the system is excluded and comparing them homogeneously.

[2] The scientific method that draws general conclusions from particular premises is defined as 'inductive analysis' (Moore, 2010).

[3] The scientific method that draws particular conclusions from general premises is defined as 'deductive analysis' (Moore, 2010).

Furthermore, the software influences all **three areas of crime**: prevention - as it has been explained above, prosecution of crime, and the legal-procedural part after the crime. Regarding the prosecution of crime, the programme makes it more likely for police officers to arrest suspects and sharply decreases the number of crimes composing a criminal series (Mastrobuoni, 2017). From a procedural point of view, the identification of a serial crime makes it possible to group individual cases into one single criminal case, prosecuting the perpetrator for a greater number of crimes and with a longer sentence, therefore more effectively.

Beyond the strengths that the software can present, it is relevant to know that software is one of the few that went through an **evaluation process** - both internal and external. According to data available on Delia®'s official website since 2008, the programme has been subjected to two different phases of experimentation at the Milan police headquarters.

It was first used in the periphery of the city of Milan to counter robberies in shops, already registering a decrease of 28% of robberies in the first year (from 664 to 481).[4] From its first year of experimentation until 2017, an almost constant decrease in the number of robberies, as well as an increase in cases resolved by KeyCrime has been measured (Fig. 1 and 2). Due to the success of this first test, the software application was extended to the entire province of Milan (3,234,658 inhabitants) and included robberies in banks[5]. Since its application in this context, the results obtained improved significantly, already in the first year, the rate of cases resolved by 37 %.

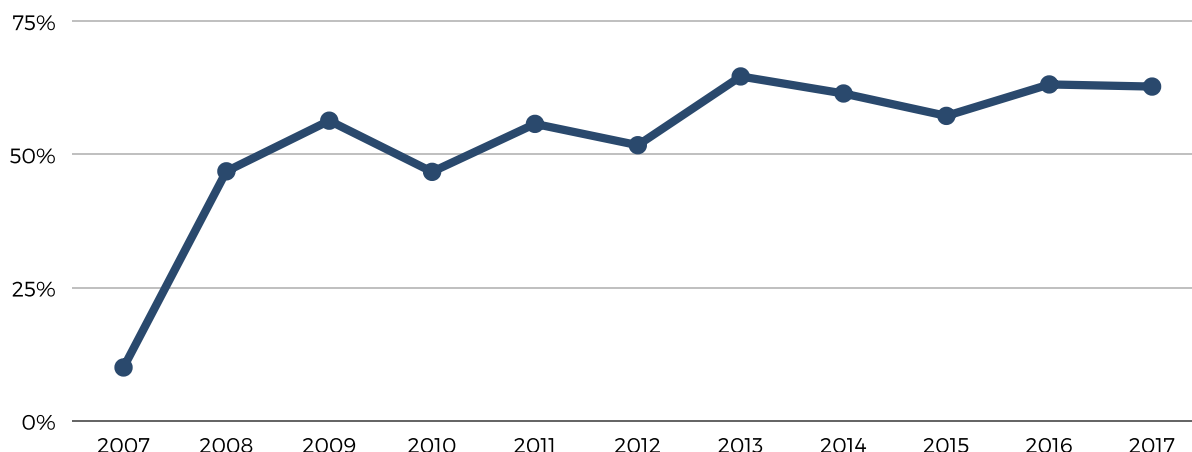


[4] In 2017 Milan was the second largest Italian city by population (1,380,873), with an area of 181.67 km². The decision to focus on robberies was due to the large number of businesses affected by this illicit act, about 700 cases per year (Venturi, 2014; Taurisiano, 2016) and the dual nature of the crime of robbery, which made it a particularly interesting type of crime to analyse - being it an action against the person and against property.

[5] ISTAT, 01/2019.

[6] Associazione Bancaria Italiana, 2019: pp. 90-92.

Fig. 2 Robberies solved by KeyCrime in Milan between 2007-2017 [7]



With regard to the external evaluation, Delia® has been analysed by the security economist Mastrobuoni (2020), who studied the application of the software in Milan, corroborating the data obtained and the reason for Delia®’s effectiveness. After a comparative analysis of the two main Italian police forces, the Carabinieri and National Police, acting in the same area with one using the program and the other using traditional investigative techniques, Mastrobuoni showed that Delia® increased the probability of solving a serial crime by 8%, reducing the number of robberies that each criminal (group) is able to carry out prior to their arrest, from an average of 17.8 crimes to 6.4 and with a maximum of 11 robberies per series. In the case of bank robberies, a change in criminal tendency at the local level has been identified (Mastrobuoni, 2017). After analysing the number of bank robberies committed monthly between 2004 and 2015 in the ten largest cities in Italy (Milan, Turin, Genoa, Bologna, Verona, Venice, Florence, Rome, Naples and Bari), Milan turned out to be the city with the largest number of cases of this crime. However, during the years of implementation of the programme (from 2008), this trend was reversed from a robbery rate of 1.4 to 0.5 per 100,000 inhabitants.

Mastrobuoni argues that the reason behind Delia®’s results is based on the software’s ability to identify some of the key factors that determine the persistence of a crime. According to his analysis, some elements are more relevant than others in explaining that a crime remains immutable in time and space, since “criminal groups tend to select the same type of target at

[7] Ibid. p.91

the same time of day and in the same area, especially if the first crime has been "successful." Thus, all information concerning the time, the area of action, the distance between the first and the second crime and the objective of the crime, are elements that Delia® takes into consideration from its first phase of analysis, integrating it into the entire analytical process. Thus, all information concerning the time, the area of action, the distance between the first and the second crime and the objective of the crime, are elements that Delia® takes into consideration from its first phase of analysis, integrating it into the entire analytical process.

"Automation, Artificial Intelligence, Deep Learning: this is Delia® natural evolution, by KeyCrime. Our main aim will always be to support the Police forces, and we will keep improving by amplifying the potential of technologies through an effective interdependence between the human being and the tool and the respecting of privacy."

Mario Venturi

Another relevant fact of Mastrobuoni's analysis is the **economic benefit** of using this programme. According to the author, applied at the three levels of the crime (prevention, prosecution of crime, and the procedural-legal part), Delia® leads to a reduction in the cost and considerable operational efforts, in addition to speeding up the procedural and criminal phase of the case. In fact, the application of Delia® does not imply an additional investment in personnel, as at the operational level the program allows for more precise action of the patrols, which will be sent to the areas of greatest risk previously selected. In addition, fewer legal personnel will be involved in the resolution of a case, making the processes more agile and more precise, ending in longer sentences and helping to reduce the crime rate.

WHAT ARE THE RISKS?

Nevertheless, despite the apparent benefits of programmes such as Delia® and others in the predictive intelligence analysis, their use has sparked debate in relation to three main aspects. Firstly, a careful and “by the book” collection and insertion of data in the programme is required, otherwise there is a risk of undermining the **individual rights** and creating a **bias** in the investigation. It is, indeed, crucial that users receive a comprehensive **training** and that only a number of individuals get access to the programme to uphold the protection of data.

The second aspect to be highlighted is the possibility of “**false positives**” when the programme categorises someone as a persistent offender, meaning an analyst’s supervision necessary at all times and “(...) identifies these errors as early as possible” (Hildebrandt, 2017: 10). Thirdly, predictive analysis programmes have been often applied only to a few type of crimes, which raise doubts on their **usability in other criminal circumstances**. For instance, Delia® coincided with a reduction in commercial robberies but not other crimes, and there is no evidence of displacement across space and crime types. Further assessments should be made in this direction.

All in all, Delia® and other predictive software may be promising for the future of the intelligence and show a new trend in intelligence analysis. Italy has clearly shown interest in this new area and will likely continue investing in it. Yet development of such programmes and application of new technologies should go hand in hand with the design of a clear legal framework to operate within.

REFERENCE LIST

Associazione Bancaria Italiana, (2019). Rapporto intersettoriale sulla criminalità predatoria. Ossif. Retrieved from: <https://www.confcommercio.it/documents/20126/1302096/Rapporto+Ossif+2018.pdf/7874c06e-a62a-17fe-ea32-38e21d8356b6?t=1547552006000>

Dugato, M., Caneppele, S., Favarin, S., Rotondi, M. (2015), Prevedere i furti in abitazione, *Transcrime Research in Brief*, 1(2015), Retrieved from: <https://www.yumpu.com/it/document/read/55225697/transcrime-research-in-brief/2>.

Ecco l'algoritmo che predice il reato: arrestato un ladro. (2018, November 16) La Repubblica. Retrieved from: https://www.repubblica.it/cronaca/2018/11/16/news/ecco_il_sistema_che_predice_il_reato_arrestato_un_ladro-211829383/

Heuer, R. J. (1999). *Psychology of Intelligence Analysis*. Saffron Walden, UK: Books Express Publishing.

Hildebrandt, M. (2017). Law as computation in the era of artificial legal intelligence. Speaking law to the power of statistics. *SRRN Electronic Journal*. Retrieved from: <https://dx.doi.org/10.2139/ssrn.2983045>

ISTAT. (2019, January 1). Retrieved from: http://dati.istat.it/Index.aspx?DataSetCode=DCIS_POPRES1.

Mastrobuoni, G. (2020). Crime Is Terribly Revealing: Information Technology And Police Productivity. *Review of Economic Studies*. Retrieved from: <https://dx.doi.org/10.2139/ssrn.2989914>

Mastrobuoni, G. (2014). Crime Is Terribly Revealing: Information Technology And Police Productivity. *University of Essex*. Retrieved from: <http://www.hec.unil.ch/documents/seminars/deep/1587.pdf>.

Moore, D. T. (2010). *Critical Thinking And Intelligence Analysis*. Washington, DC: National Defense Intelligence College.

Taurisano, G. (2016). KeyCrime: Scienza e progresso per la predictive policing italiana [Blog post]. Retrieved from: <http://www.crimelist.it/index.php/analisi/criminologia/868--keycrime-scienza-e-progresso-per-la-predictive-policing-italiana>

Venturi, M. (2014). KeyCrime - La chiave del crimine. *Profiling - I profili dell'abuso*, 4(5). Retrieved from: <https://www.onap-profiling.org/keycrime-la-chiave-del-crimine/>



FOR MORE INFORMATION ON
THIS TOPIC AND ON OUR
PROJECTS PLEASE VISIT:

AGENFORMEDIA.COM