NETWORK ANALYSIS AND «PREDICTIVE POLICING»: TOWARDS A «PROFILING SOCIETY»?

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Abstract: *Network analysis is a powerful tool that is increasingly used not only to determine events that occurred in the past, but also to predict what may happen in the future. This paper will discuss the perspective, far from being abstract or remote, that such methods may be adopted in order to anticipate crimes. Taking into account current technologies, present legal science and according to the recent «Onlife Manifesto», here are talked three issues, concerning respectively the epistemological, the legal-philosophical and the anthropological aspect. In the first place, the relevance of the information provided in a crime's «prediction», since it does not concern an event of the past. Secondly, the nature of responsibility ascribed on these grounds, as neither an «actus reo» nor a «mens rea» can be found in the case. Finally, the kind of punishment could be given to the supposed criminal, because free will should be doubted if his behaviour could be foreseen.*

1. Introduction

It can be said that from a legal perspective the network is considered at least in four ways: (1) as source of information;[1] (2) as subject of discipline;[2] (3) as theoretical model;[3] (4) as heuristic tools.[4]

This paper will address the use of network analysis as a semantic tool – as in the fourth perspective above mentioned – used to retrieve links among people. Indeed, everyday experience brings us that the profiling of Internet users has achieved very advanced levels and, according to recent studies, it is possible to anticipate

[1] Networks are nowadays the major source of information as data are immediately available in large quantities and can be easily processed.

[2] The intensive use of networks has given rise to a specific discipline of studies called *cyberlaw*, whose birth certificate can be identified in the statement: «*The Internet is therefore a unique and wholly new medium of worldwide human communication*» Finding n. 81, *American Civil Liberties Union v. Reno*, 11th June 1996, United States District Court for the Eastern District of Pennsylvania, in 929 F. Supp. 824, 830–849 (ED Pa. 1996). The same quote can be found in the appeal decided by the Supreme Court of the United States, *Reno v. American Civil Liberties Union*, case No. 96–511, 19th march 1997–26th June 1997, in 521 U. S. 844 (1997).

[3] The network has become the representation used by scholars in applying the complex system's theory to law developing a synthesis of theory of the sources of law, theory of legal interpretation and theory of judicial argumentation, Pagallo, Il diritto nell'eta dell'informazione. Il riposizionamento tecnologico degli ordinamenti giuridici tra complessita sociale, lotta per il potere e tutela dei diritti, Pagallo, U., Digitalica, 12, Giappichelli, Torino, 2015. The decentralized network is the most interesting pattern since it represents information flow, social ties and semantic representations, hence it is argued to show connections among technology, society and mind, Baran, On Distributed Communications Networks. RAND Corporation papers, RAND, 1962.

[4] Recently Network analysis has been used to detect semantic connections among legal documents, hence retrieving information on the legal system in which they are set, see recently the third International Workshop «Network Analysis in Law» in conjunction with JURIX 2015 held in Braga, http://www.leibnizcenter.org/{~}winkels/NAiL2015.html (all web pages last accessed on 9 January 2016).

collective events,[5] influence user's feelings,[6] diagnose mental illnesses,[7] and, in some cases, predict individual behaviour.[8]

So, if one can foresee legitimate activities of Internet users, such as the purchase of goods or services, would it be possible to predict even illegal behaviours and crimes in particular? As an example, let us assume that a subject A: (1) has purchased some dangerous items W_1, W_2, W_3, W_n; (2) has shown preferences (for example with the «like» on Facebook) for hateful contents (for example, a YouTube video, an image on Tumblr, a Web page, a Facebook comment) X_1, X_2, X_3, X_n, which are linked to a sociopathic profile; (3) has connections with users Y_1, Y_2, Y_3, Y_n, all bearing criminal records; (4) is a regular attender of Z_1, Z_2, Z_3, Z_n, notorious «hot spots» for illicit activities. What if, based on these data, an algorithm stated that – in a certain range of places and time – subject A could commit a crime against an identified subject B?

Since this is not a dystopian science fiction vision but a realistic perspective,[9] and in order to offer a theoretical appraisal, I take into consideration the outlook emerging from the «Onlife Manifesto»,[10] a very interesting volume published by a group of scholars[11] coordinated by Luciano Floridi, founder of the «Philosophy of Information».[12] The key point of such perspective is the claim that ICTs «*are not mere tools but rather environmental forces that are increasingly affecting: 1. our self-conception (who we are); 2. our mutual interactions (how we socialise); 3. our conception of reality (our metaphysics); and 4. our interactions with reality (our agency)*».[13]

After providing an overview on the state-of-the-art in the field of study called «predictive policing», I focus is on the main emerging issues, namely: (1) the legal value of the information retrieved with such methods; (2) the nature of responsibility in an indictment grounded on such basis; (3) the meaning of punishment in such perspective. In conclusion, I offer some final concerns.[14]

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5 Kreimer, Technologies of protest. Insurgent Social Movements and the First Amendment in the Era of the Internet, University of Pennsylvania Law Review, volume 150, issue 1, 2001, p. 119-171, Zabala, Predicting the future through online data mining. http://www.aljazeera.com/indepth/opinion/2012/10/201210210552366193 5.html, 2012.

6 In 2014 Facebook released a report on the development of romantic relationships on the occasion of day of Saint Valentine, https://www.facebook.com/data/posts/10152217010993415.

7 Kramer/Guillory/Hancock, Experimental evidence of massive-scale emotional contagion through social networks, Proceedings of the National Academy of Sciences, volume 111, issue 24, 2014, p. 8788–8790, Saeb/Zhang/Karr/Schueller/Corden/Kording/Mohr, Mobile Phone Sensor Correlates of Depressive Symptom Severity in Daily-Life Behavior: An Exploratory Study, Journal of Medical Internet Research, volume 17, issue 7, 2015.

8 Reed/Segal, Social network analysis and counterinsurgency operations. The capture of Saddam Hussein, Sociological Focus, volume 39, issue 4, 2006, p. 251–264, Wang/Xu/Wu/Zhou, Link Prediction in Social Networks: the State-of-the-Art, Science China-Information Sciences, volume 58, 2015.

9 In Italy, Mario Venturi – police officer in Milan – developed a software tool called KeyCrime, which has a conspicuous rate of success in predicting armed robberies, http://keycrime.com.

10 Floridi (Ed.), The Onlife Manifesto. Being Human in a Hyperconnected Era, Open Access Springer International Publishing, Cham, 2015, https://ec.europa.eu/digital-agenda/en/onlife-manifesto.

11 Stefana Broadbent, Nicole Dewandre, Charles Ess, Jean-Gabriel Ganascia, Mireille Hildebrandt, Yiannis Laouris, Claire Lobet-Maris, Sarah Oates, Ugo Pagallo, Judith Simon, May Thorseth, and Peter-Paul Verbeek.

12 A precise definition of «Philosophy of information» has been given as follows: «*The philosophical field concerned with (a) the critical investigation of the conceptual nature and basic principles of information, including its dynamics, utilization and sciences, and (b) the elaboration and application of information-theoretic and computational methodologies to philosophical problems*» Floridi, The philosophy of information, Oxford University Press, Oxford, 2010, (p. 46).

13 Floridi, Introduction. In: Floridi, L. (Ed.), The Onlife Manifesto Springer International Publishing, 2015, p. 1–3, (p. 2).

14 For the sake of brevity I show only the main references.

2. Short overview on «predictive policing» and its meaning

In 2009, at the first symposium on the subject, «predictive policing» was defined as: «*any policing strategy or tactic that develops and uses information and advanced analysis to inform forward-thinking crime prevention*».[15]

Such «*intelligence-led policing*»[16] is different from both «*criminal pattern analysis*»[17] and «*smart policing*»: the first is a simple activity of «crime mapping»[18] based on the estimation of crimes previously committed,[19] the latter is an investigation approach implemented with the most advanced techniques and strategies.[20] Indeed, the key feature of «predictive policing» is not in the use of ICTs,[21] but in its purpose, which is «*to transform policing from a reactive process to a proactive process*».[22]

Many opinions are raised with respect to such new discipline. Evidently the favorable emphasize the benefits to public order and the reduction of the social costs or risk for people, while opponents express concerns from different points of view and in particular: (1) the mathematical models adopted;[23] (2) the risk of abuse by political authorities;[24] (3) the prejudice for the rights of defense in criminal proceedings;[25] (4) the ethical implications of such a pervasive use of data.[26]

The key aspect concerning «predictive policing» in this study can be focused emphasizing the association between «intelligence» and «proactivity». Indeed, here data are not processed simply to establish past facts, or to describe a present situation – as in a traditional investigation – or to forecast upcoming events. Since the scope in «predictive policing» is specifically to anticipate events, connections among causal factors are identified in order to change their impact, thus to obtain the outcome, which was previously set as strategic target.[27]

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15 Uchida, A national discussion on predictive policing: Defining our terms and mapping successful implementation strategies. National Institute of Justice, 2009, (p. 1). This definition was given by John Morgan, Director of NIJ's Office of Science and Technology in 2010. In the Report, social network analysis was explicitly mentioned among the fields of this discipline. A more recent definition is offered in Goerzig, Expanding Predictive Policing, Enhancing Infiltration Strategies, International Journal of Social Science and Humanity, volume 6, 2016, p. 356-363.

16 Sklansky, The persistent pull of police professionalism, New Perspectives in Policing, March, 2011.

17 Shekhar/Mohan/Oliver/Zhou, Crime pattern analysis: A spatial frequent pattern mining approach. DTIC Document, 2012. It is useful to specify that «predictive policing» operates on two levels, the collective one and the individual one: the first intents to anticipate public unrests or fight against criminal organizations or even tackle terrorist groups; the second aims to prevent individual crimes, Adrangna/Andrews/Bolton/Brogan-Ding/Carter/Donohoe/Glenn/Kahl/Marshall/Morales, Predictive Policing: A Review of the Literature. Criminology and Criminal Justice Senior Capstone. Criminology and Criminal Justice Senior Capstone Project. Paper 5. Portland State University, 2012.

18 Groff/La Vigne, Forecasting the future of predictive crime mapping, Crime Prevention Studies, volume 13, 2002, p. 29–58.

19 Wang/Rudin/Wagner/Sevieri, Learning to detect patterns of crime. Machine Learning and Knowledge Discovery in Databases Springer, 2013, p. 515–530.

20 White/Uchida, Smart policing: What's in a name?, The Criminologist, volume XXXVIII, issue 5, 2013, p. 54–56.

21 Hartle/Parker/Wydra, The digital case file: The future of fighting crime with big data, Issues in Information Systems, volume XV, issue 1, 2014, p. 257–266.

22 Andrew Adams, in Greengard, Policing the future, Communications of the ACM, volume LV, 2012, p. 19–21, (p. 19).

23 Ridgeway, The pitfalls of prediction, NIJ Journal, volume 271, 2013, p. 34–40. The author was Director of NIJ when the paper was published.

24 Byrne/Marx, Technological innovations in crime prevention and policing. A review of the research on implementation and impact, Journal of Police Studies, volume 20, 2011, p. 17–40.

25 Joh, Policing by Numbers: Big Data and the Fourth Amendment, Washington Law Review, volume LIX, issue 35, 2014, p. 34–68, Joh, Bait, Mask, and Ruse: Technology and Police Deception, Harvard Law Review Forum, volume CXXVIII, 2014, p. 246–252.

26 A critique to «solutionism» in sociological terms, Morozov, To save everything, click here. The folly of technological solutionism, Public Affairs, New York, 2013.

27 It is interesting that the power of manipulation is said to be no longer about the data, but in their strategic or «proactive» use. The conclusion is logically correct but leads to a paradoxical outcome: «*The need to distinguish intelligence from information, which determines what is and is not protected under privacy laws*» Uchida, A national discussion on predictive policing: Defining our

Since, according to «predictive policing», crimes can be prevented altering the chain of events by managing the information they embody, it can be argued that this discipline is ultimately a sort of control of human relations: a cybernetic version of policing[28]. Indeed, in it we can see not the mere adoption of technology in criminal investigations, but a technological *Weltanschauung* of the world in which they are carried out.

3. Epistemological issues: «predictive policing» in legal proceedings

The first order of issues can be introduced wondering what is worth the information given by the outcome of an algorithm assessing the chance that subject A could assault subject B in a certain range of time and places.

In the «Onlife Manifesto» human experience is called «Infosphere»,[29] which has namely two meanings:[30] the firs can be said «logical», since «*it denotes the whole informational environment constituted by all informational entities (thus including information agents as well), their properties, interactions, processes, and mutual relations*»;[31] the second can be assumed as «ontological», as «*it is a concept that, given an informational ontology, can also be used as a synonymous with reality, or Being*».[32]

According to this perspective, it can be argued that the prediction that subject A could commit a crime against subject B is very difficult to fit in traditional concepts such as «proof» and «presumption». Hereinafter I offer some considerations with respect to each profile.

It is debatable to qualify as «proof» the mere connection between subjects, because: (1) it refers to odds and not to facts; (2) the concept of «probability» is different both from argumentative «truth» (classical conception of proof) and empirical «certainty» (modern conception of proof); (3) it is difficult to assign onuses and obligations to parties in a process («burden of persuasion» or «burden of production»)[33] with respect to probabilities.

Having regard to «presumptions», namely the judicial proof of an unknown fact by deducing known circumstances, we encounter similar difficulties because: (1) the fact to be proved is placed in the future, so it is not correct to assume simply that it is unknown, because it is actually not happened;[34] (2) it is not clear how in a judicial process should be managed the knowledge represented by a probability (for example, on which grounds it should be considered full evidence or just an *Anscheinsbeweis*).[35]

According to these concerns, it appears that the information provided by «predictive policing» could represent at least a judicial argument, so its influence could depend by elements quite not suitable to be computed, such as the acceptance of the audience[36] or the «warranties» provided by the parties.[37]

terms and mapping successful implementation strategies. (p. 10).

28 Wiener, Cybernetics or control and communications in the animal and the machine, Actualités scientifiques et industrielles, 1053, Hermann & Cie-The Technology Press, Paris-Cambridge, 1948.

29 Floridi, Hyperhistory and the Philosophy of Information Policies. In: Floridi, L. (Ed.), The Onlife Manifesto, (p. 53). This notion is similar to that of the «noosphere», the spiritual dimension reached by humanity once overcome the levels of existence where lie inanimate things (geosphere) and other living creatures (biosphere), according to Theilhard de Chardin.

30 Floridi, Philosophy and computing. An introduction, Routledge, London; New York, 1999.

31 Floridi, The Ethics of Information, Oxford University Press, London, 2013, (p. 6). This definition is qualified as «minimalistic» in Floridi, The 4th Revolution. How the infosphere is reshaping human reality, Oxford University Press, Oxford, 2014, (p. 41).

32 Floridi, The Ethics of Information, p. 6. This definition is qualified as «maximalistic» in Floridi, The 4th Revolution. How the infosphere is reshaping human reality, p. 41.

33 Tuzet, Filosofia della prova giuridica, Recta ratio. Testi e studi di Filosofia del Diritto. Sesta Serie, 117, Giappichelli, Torino, 2013.

34 Gettier, Is Justified True Belief Knowledge?, Analysis, volume 23, issue 6, 1963, p. 121–123.

35 Prakken/Sartor, Presumptions and Burdens of Proof, Eui Working Papers. Law, volume 36, 2006.

36 Perelman/Olbrechts-Tyteca, La nouvelle rhétorique. Traité de l'argumentation, Presses universitaires de France, Paris, 1958.

37 Toulmin, The Uses of Argument, Cambridge, University Press, 1958.

4. Issues concerning criminal science: «predictive policing» and responsibility

The second aspect can be addressed by wondering what kind of responsibility may be ascribed to subject A with respect to subject B.

According to the «Onlife Manifesto», to understand our Hyperconnected Era we should develop a completely new mindset and specifically «*(i) a new philosophy of nature, (ii) a new philosophical anthropology, (iii) a synthetic e-nvironmentalism as a bridge between us and the world, and (iv) a new philosophy of politics among us*».[38] If, following this path, it can be said that «*what is real is informational and what is informational is real*»,[39] the whole society can be described as an unceasing exchange of information among agents.

Provided that, the reaction to crime of the legal system cannot be explained by the definition of responsibility provided in traditional criminal science. Indeed, to charge someone with an indictment a previous behaviour and a guilty mindset are needed, «*actus reus*» and «*mens rea*»,[40] and both are missing in «predictive policing». In such perspective, the liability is allocated only by an algorithm, namely by the simple association of the data related to the crime, the possible victim and the context of the likely conduct. This seems inadequate to support an indictment considered the basic legal principles of western civil culture, and still more in the light of the general prohibition of «automated individual decisions» as stated in Article 15 Directive 95/46/EU,[41] in Article 19 Regulation (EC) No 45/2001,[42] and in Article 20 of the «General Data Protection Regulation» that soon will enter into force.[43]

5. Ethical issues: «predictive policing» and punishment

The third aspect can be introduced, continuing the above example, by asking what penalty – and on what theoretical basis – may be enforced to the subject A for the crime that he is expected to commit against the subject B.

According to the «Onlife Manifesto», the advent of ICTs has made an anthropological change, raising a previously unknown human condition: we would have become «*informational organisms*».[44] Precisely, we should be considered «inforgs», since «*we are informational organisms (inforgs), mutually connected and embedded in an information environment (the infosphere), which we share with other informational agents, both natural and artificial, that also process information logically and autonomously*».[45]

Within this perspective, it can be argued that the «anticipation» of crime, the key concept of «predictive policing», is not a punishment. This issue is very important since in criminal science the purpose of punishment

[38] Floridi, Hyperhistory and the Philosophy of Information Policies. In: Floridi, L. (Ed.), The Onlife Manifesto, (p. 54).

[39] Floridi, The 4th Revolution. How the infosphere is reshaping human reality, p. 41. This is a remarkable quote of Hegel «*was vernünftig ist, das ist wirklich, und was wirklich ist, das ist vernünftig*» Hegel, Grundlinien der Philosophie des Rechts. In: Glockner, H. (Ed.), Sämtliche Werke. Jubiläumsausgabe in zwanzig Bänden. Einer Hegel-Monographie und einem Hegel-Lexikon F. Frommann Verlag (Gunther Holzboog), Stuttgart-Bad Cannstadt, 1964, (p. 33) (17 original version), Hegel, Enzyklopädie der philosophischen Wissenschaften. In: Reinicke, H. (Ed.), Werke in zwanzig Bänden, Suhrkamp Taschenbuch Wissenschaft, 601–621, Suhrkamp, Frankfurt am Main, 1986, (p. 47) (§6).

[40] Klip, European criminal law. An integrative approach, Ius communitatis, 2, Intersentia, Antwerp, 2012, (p. 200–205).

[41] Directive 95/46/EU of the European Parliament and of the Council of 24 October 1995 *on the protection of individuals with regard to the processing of personal data and on the free movement of such data*, in OJEU L 281, 23 November 1995, p. 31–50.

[42] Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 *on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data*, in OJEU L 008, 12 January 2001, p. 1–22.

[43] Proposal for a regulation of the European Parliament and of the Council *on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)*, COM/2012/011 final.

[44] Floridi, Hyperhistory and the Philosophy of Information Policies. In: Floridi, L. (Ed.), The Onlife Manifesto, (p. 58).

[45] Floridi, The 4th Revolution. How the infosphere is reshaping human reality, p. 94.

depends by the anthropological perspective adopted, and specifically by acknowledging or not free will in human nature. Indeed, the «anticipation» is not envisaged in any of the theories of penalty debated in criminal science – remuneration (*Vergeltung*), atonement (*Sühne*), general prevention or individual deterrence – and does not even comply with current definition of European law, which requires explicitly «*effective, proportionate and dissuasive criminal sanctions for a specific conduct*».[46] A striking consequence is that, strictly speaking, a «proactive» reaction to crime does not need to be brought to court and so it may directly be enforced: this is another matter of concern.

The key point is that, in light of «Onlife Manifesto», the reaction provided by the «predictive policing» to the probability of crime might be considered as a kind of «feedback» of the legal system. In this view, it should be said that the likely crime is nothing more than an anomaly or a kind of disturbance that induces the system to generate a certain effect aimed to neutralize it and restore the equilibrium in the flow of information.

Many scholars who have dealt with such issue do not fully estimate these entailments. If «predictive police» has to «anticipate» crime, then its goal is not just to punish the agent after the offense, but properly to control his behaviour in order to reduce the risk of committing it; in an «Information society», this task could be accomplished only by gauging the inputs from which the subject shapes his representation of reality. In such perspective, it seems difficult to argue that free will could belong to humans – seen as *Inforgs* – since it is assumed not only that our actions are predictable, but also that they should be controllable by some kind of police authority.

6. Conclusions

Apart from the example provided, we should acknowledge that – as a matter of fact – network analysis is an useful tool of «predictive policing» actually more suitable to be applied to collective phenomena rather than to individual behaviour, and more effective with cybercrimes than with common offenses. Some relevant concerns emerge from the theoretical assumptions, expressed in the «Onlife Manifesto», and from the perspective that these technologies could be used – also in a near future – as a tool of massive and pervasive social control.

The «Onlife Manifesto» represents a cybernetic vision in which our everyday experience – the «Society of Information» – is assessed in a naturalistic perspective, or «*juxta propria principia*».[47] The «predictive policing» is well suited in this context, since it exploits the two main claims of cybernetics: the ontological one, intrinsic in the reduction of reality to information, and the epistemological one, concerning the control of human behaviour.[48]

We can argue that the use of network analysis in «predictive policing» could lead to a kind of «profiling society», since it assumes that people's behaviour should be constantly monitored, because only in this way it would be possible to «anticipate» crimes and thus to «influence» agents.[49] This perspective could be seen as

[46] «*Effectiveness requires that the sanction is suitable to achieve the desired goal, i.e. observance of the rules; proportionality requires that the sanction must be commensurate with the gravity of the conduct and its effects and must not exceed what is necessary to achieve the aim; and dissuasiveness requires that the sanctions constitute an adequate deterrent for potential future perpetrators.*» COM/2011/573 final, *Towards an EU Criminal Policy: Ensuring the effective implementation of EU policies through criminal law*.

[47] Telesio, De rerum natura iuxta propria principia, Opera omnia, 4, Casa del libro, Cosenza, 1965-1971.

[48] From a historical perspective may be drawn an analogy with Nineteenth Century's positivism, Adolf/Stehr, The Return of Social Physics? Proc. Of The The Technology of Information, Communication and Administration – An Entwined History, 2015. This perspective is confirmed by a recent renewal of interest for Lombrosian studies Velo Dalbrenta, In search of the Lombrosian type of delinquent. In: Knepper, P. and Ystehede, P. (Eds.), The Cesare Lombroso Handbook Routledge, Abingdon, 2013, p. 214–225.

[49] This is very interesting for Legal informatics, hence such field of inquiry finds its roots in a proposal to study judicial proceedings in order to «anticipate» decisions and thus develop a strategic – «intelligent», we could say today – analysis on litigation, Loevinger, Jurimetrics: The Next Step Forward, Minnesota Law Review, volume 33, 1949, p. 455–493, Loevinger, Jurimetrics: Science and Prediction in the Field of Law, Minnesota Law Review, volume 46, 1961, p. 255–275.

an evolution in the concept of social control, from a «bio-political» to an «info-political» one.[50]

If it is true that law exists where there is free will, and this is why both are prerogatives of humankind – animals do not dispute in courts and machines are not constraint in prison – the use of network analysis as a «predictive policing» tool, in the theoretical background of the «Onlife Manifesto», reveals a technological vision of law, which ultimately justifies a kind of cybernetic «control» over society and discards moral freedom as the essence of human nature.

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Joh, Elizabeth E., Policing by Numbers: Big Data and the Fourth Amendment, Washington Law Review, volume LIX, issue 35, 2014, p. 34–68.

[50] Symbolically, as well as the public torture carried out on the physical body of the subject displayed the absolute power of the sovereign in the Renaissance, today the management of personal data – the «digital body» of the inforg – shows the power of who owns technologies, Foucault, Surveiller et punir. Naissance de la prison, Gallimard, Paris, 1975.

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