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What Can (not) Deontic Logic Do for Computer Law

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By Alessandro Pizzo*

INTRODUCTION

Since 1951 Deontic Logic, founded by Georg Henrik von Wright¹, a Finnish logician and philosopher, Wittgenstein's scholar, showed its particular attitude to serve many branches of philosophical research, from the logic to the law².

Despite it actually the things are not so and the reason is simple: deontic logic only captures our normative intuitions, moral underlying structure of our language³, but nothing more. And the reason of this is clear. In fact, deontic logic was born as a particular logical treatment of non – assertoric propositions, an result by recent logical neopositivism⁴. There exists a tension between formal theory and the language⁵, notably practical language. But this doesn't prevent to formalize normative uses of the language.

It seems to me that it's a useful tool for analyzing the normative uses of moral language, what we use to express normative sentences or commands, forbids and so on ... Perhaps the same normative stances that we use in law.

So, I wish to describe in this paper what can deontic logic do for a particular branch of law: computer applications to it. At all, I think about the deontic logic as a tool for computer law, even if there are many difficulties that must be considered before to go beyond.

COMPUTER LAW

Since 1949 Information Technology had a great influence on Law, not only on the study of Law, but on the Law's applications too. In fact, it appeared immediately how it's important to upgrade the Law to new developments of human history.

Loevinger first proposed to use a new term, *Jurimetric*, for this new field of Law, today well known as Computer Law⁶. Probably, he thought of computers as possible tools for teaching law (i.e. law's learning) or to solve some tasks (i.e. records of cases).

On the same path, Wiener proposed to use information technology for every field of Human life. So, for to solve many legal problems too.

Then the term 'Jurimetric' means 'the scientific investigation of legal problem' with the aid of the computers or of the cybernetics. What can computer do for the law? Generally, its aid consists in the following possibilities:

- 1) To process legal data;
- 2) To record legal data;
- 3) To model legal examples of legal reasoning.

In Italy, Frosini proposed two different matters:

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1 Cfr. S. O. HANSSON, *Ideal Worlds – Wishful Thinking in Deontic Logic*, "Studia Logica", 82, 2006, p. 329.

2 Cfr. A. ARTOSI, , *Il paradosso di Chisholm. Un'indagine sulla logica del pensiero normativo*, Clueb, Bologna, 2000, p. 7.

3 Cfr. N. RESCHER, *Topics in Philosophical Logic*, Reidel, Dordrecht, 1967, p. 231. The author suggests to face the difficulties in deontic logic as an attempt to account for gap between formal language and moral reality.

4 Cfr. N. RESCHER, *The Logic of Commands*, Routledge & Kegan Paul, London, 1966, p. vi. I suggest to consider Jørgensen's dilemma as a particular form of this public debate: are the norms true or false?

5 Cfr. S. O. HANSSON, *Formalization in Philosophy*, "The Bulletin of Symbolic Logic", 2, 2000, p. 163. According to the author, the philosophy always formalize even when it doesn't seem. Single concepts are reality's formalizations yet. It seems to me that's a correct perspective, even if I have some reservation about it.

6 This field is named 'Informatica giuridica' in Italian tongue.

- i) Document 'informatica giuridica';
- ii) Metadocument 'informatica giuridica'.

The former means the computer law as expressed under (1) and (2) while the latter means it as expressed under (3).

In 1969, another Italian scholar, Losano proposed to use the term 'Giuscibernetica' meaning with it cybernetics' applications to the law⁷.

More precisely, he wanted to overcome Loevinger's approach distinguishing four different modes to do 'informatica giuridica' or Computer Law:

- (x) Philosophical approach;
- (xx) Cybernetics with feedback;
- (xxx) Modern Logic's applications to law's formulae;
- (xxxx) Computer's uses in the Law's every field.

It seems to me that Losano's four modes can be considered as simple different targets, but there are not important differences between modes (x) – (xxxx).

So I think that computer law can take care of Losano's modes at all as long as who writes have clear ideas about it.

Surely, as von Wright puts: «the novelty of computer technology consists in its revolutionizing impact on the work of the brain for purposes of human cognition»⁸. Even if there is who thinks that we are in error because the phrase 'informatica giuridica' means that «l'informatica giuridica [...] si occupa dell'applicazione dell'informatics ai contesti giuridici e come tale coinvolge tutte le organizzazioni che hanno a che fare con la legge, gli utenti dell'informazione e l'uso delle tecnologie all'interno di queste organizzazioni e dei loro utenti»⁹. So, if we won't confuse between *Legal Informatics* and one application of *Computer Science* to the Law, there are some different meanings of our expression:

- i) A study about information retrieval's technics;
- ii) A study about the relationship between the Law and the information technology;
- iii) A study about the admittance to legal informations;
- iv) A study about different legal operator's practices (i.e. judges; lawyers; and so on)¹⁰.

This is certainly one perspective of the many others, but it isn't one of the mines too.

We live in computer technology's revolution and it can to have a grave impact on our life, with social costs and benefits. Anywhere nobody can to renounce to computer nor to the information technology. What life would be without it? So, our life is influenced by computer solutions, by computer technology. It is determined by computer's possibilities and limits. But this is our life!

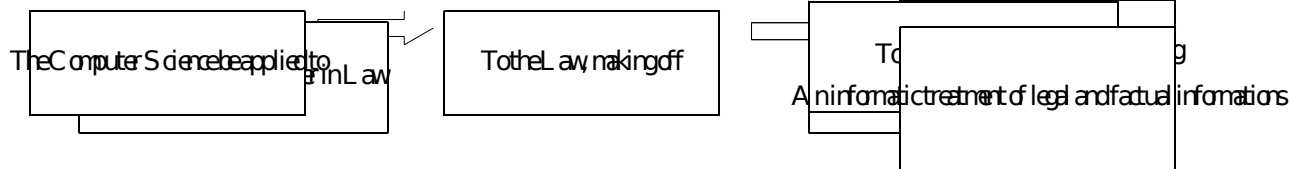
Computers aids our life, so it helps the law too. And its services are two:

7 Cfr. M. G. LOSANO, *Giuscibernetica. Macchine e modelli cibernetici nel diritto*, Einaudi, Torino 1969. Losano used new field of the Law early in time, combining traditional knowledges with new purchases. However his effort was not accepted by all the authors. Is my idea that it is depended by the choice chosen in this field: Cybernetics or Computer Science applied to the Law?

8 Cfr. G. H. VON WRIGHT, *Inaugural Address*, in A. A. MARTINO (eds.), *Expert System in Law*, North – Holland, Amsterdam, 1992, p. 1. Finnish philosopher was ever forward-looking in his considerations on human societies and the future of human culture.

9 Cfr. A. ROSSETTI, *i temi emergenti nell'informatica giuridica*, in A. ROSSETTI (ed.), *Legal Informatics*, Moretti Honegger, Bergamo, 2008, p. 13.

10 *Ibidem*.



- 1) To process legal and factual informations;
- 2) To model legal reasoning.

In brief the link between the Law and the Computer Science is well showed by following simple schema:

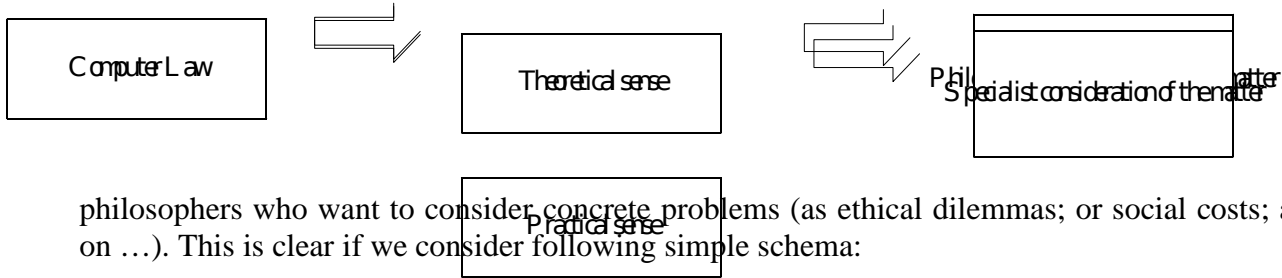
It exists a double nature of the Computer Law, if it is possible to speak in these terms: first, (i) the association of the Computer Science and the Law makes off an algorithmic process of legal and material data (i.e. to use computer technology for all functions of the Law: to yield legal documents; to require legal data; to request legal advice; and so on); second, (ii) the association of the Computer Science and the Law makes off a designed model of legal reasoning (i.e. informatic account of how the jurists reason). Why would lawyers use the computer in their jobs? Because nobody cannot use the computer in his life today.

Maybe the relationship between the law and computer is complicated but each needs of other¹¹. Today all lawyers or legal human experts utilize computers for their purposes: (a) processing legal data (i.e. to require legal precedents or to compile legal forms); (b) processing human informations (i.e. to determine the exact course of the affairs); (c) aiding to solve legal problems (i.e. to play the application of a rule). So, it's clear following schema:

Although, there exist two different, but not linked, forms of Computer Law: (i) *Theoretical Computer Law* (a philosophical perspective on the matter); and, (ii) *Practical Computer Law* (a technical perspective on the matter). The former perspective is more appreciated by not specialists of the Law (as philosophers; law teachers; and so on ...) while the latter is more important for the Law specialists (as lawyers; judges; notaries; law students; and so on ...).

However, It seems to me that this distinction reflects an analogue distinction between two different approaches to the philosophy: (1) Theoretical Philosophy; and, (2) Practical Philosophy. The former is more appreciated by 'contemplative' philosophers while the latter is more relevant for

¹¹ Cfr. V. FROSINI, *Cibernetica, diritto, società, Comunità*, Milano, 1978². I appreciate this author because he combines traditional philosophy with new theoretical frontiers.



philosophers who want to consider concrete problems (as ethical dilemmas; or social costs; and so on ...). This is clear if we consider following simple schema:

But attention: not contradict each other! First sense and second sense may very well coexist.

Under a certain perspective furthermore every problem of Computer Law is showing to represent in algorithmic form legal knowledge. But I think of not is only it¹². Moreover the core idea of Computer Law is based on Turing's conception of a computer's model – type like human agents. In fact, Turing thought of the computer as machines that suitably disguised can breed just human behavior without that we can distinguish between the ones and the others. Unfortunately we are very far from this goal because our expert systems can do many things but not repeat several behaviors out they are recognized as machines, and not as humans.

At the same time, however, actually the expert systems offer us some examples of legal applications, well known as *legal expert systems*: machine programmed to process legal data and make off legal reasoning or decisions in automatic way, without any human attendances¹³.

Obviously, I think of there exist many troubles in Computer Law, even if this is an unpalatable result of a natural difference between 'language' and 'technique', a particular tension between our moral intuitions and their formalization in Computer technology¹⁴. Somewhat it is also present in deontic logic the same tension, as Makinson says to us¹⁵ with von Wright together¹⁶.

At the last, law's life is innovated by computer technology. And it is not possible came back. If this is so, how can deontic logic help us?

DEONTIC LOGIC

Deontic Logic is naturally an important part of logic. In fact, Sartor puts: «La logica si propone di fornire strumenti per l'analisi del linguaggio e del ragionamento»¹⁷, the logic is a tool for analysing the language and the reasoning. But surely the things are more plain because there exist an agreement between three levels: (a) deontic; (b) pratic; and, (c) epistemic. So, Van Den Hoven and Lokhorst suggest the following schema¹⁸:

¹²Cfr. A. PIZZO, *Logica, informatica, scienze normative: rappresentare la conoscenza*, in "Diritto & diritti", *Electronic Law Review*, ISSN: 1127-8579, link: <http://www.diritto.it/archivio/1/20437.pdf>. It seems to me that it is not sufficient to translate into algorithmic language legal knowledge and juridical formulary.

¹³ Cfr. S. IASELLI, *Sistemi esperti legali*, Simone, Napoli, 2001. In this monograph the author accounts a brief overview about the matter.

¹⁴ Cfr. A. PIZZO, *Nodi critici dell'informatica giuridica*, in A. PIZZO, *Logica del linguaggio normativo. Saggi su logica deontica ed informatica giuridica*, Aracne, Roma, 2010, pp. 15 – 34. The Computer Law shows many points to be clarified.

¹⁵ Cfr. D. MAKINSON, *On a Fundamental Problem of Deontic Logic*, in P. MCNAMARRA – H. PRAKKEN (eds.), *Norms, Logics and information Systems. New Studies in Deontic Logic and Computer Science*, IOS, Amsterdam, 1999, p. 29.

¹⁶ Cfr. G. H. VON WRIGHT, *On the Logic of Norms and Action*, in R. HILPINEN (ed.), *New Studies in Deontic Logic*, Reidel, Dordrecht, 1981, p. 7. For von Wright the difference between formalism and normative intuitions is the root of deontic logic's many difficulties but I cannot to agree with this perspective.

¹⁷ Cfr. G. SARTOR, *Linguaggio giuridico e linguaggi di programmazione*, Clueb, Bologna, 1992, p. 362.

¹⁸ Cfr. J. VAN DEN HOVEN – G.J. LOKHORST, *Deontic Logic and Computer – Supported Computer Ethics*, "Metaphilosophy", 33, 2002, p. 379.

Deontic	Action	Epistemic/Doxastic
The right	To get	Information
The obligation	To see it that	Others know
The permission	To let someone	Know
Duty	To prevent people from	Believing falsehoods
The right	To remain	Ignorant

It's very interesting but I think of more interesting come back to deontic logic.

As said, deontic logic is a particular branch of logical research that captures logical behaviour of normative concepts. Deontic logic is a part of modal logic's rebirth in the '900s. In fact, his founder thought of it as linked to the alethic concepts, treated by Modal Logic¹⁹. So, Deontic Logic treats normative concepts as they behave under the language. In brief, it is a logic of normative expressions. As Føllesdal and Hilpinen suggest: «Normative expressions include the words 'obligation', 'duty', 'permission', 'right', and related expressions»²⁰. But we can define it as a logic of normative language because through the language we express normative uses of the same.

For Sartor Deontic Logic is problematic if we want to use it in formalization of Law under Computer Science because it makes a several number of paradoxes²¹, forbidden fruits for a rational moral theory, as the Law is. In a my recent writing I wrote:

The paradoxes invalidate host theoretical system's rationality. Since its origin deontic logic was an attempt to formalize moral reasoning, moral theory's language. Now, if it seems irrational, or incoherent in many achievement, is moral theory irrational too? [...] if deontic logic is incoherent, so inconsistent, then entire moral theory is irrational. This is a result unpalatable. In fact, it implies to expel practical reason from rational domain²²

Artosi, for example, thinks of it as Sartor²³, but it seems to me that's an exaggeration because deontic logic's task is not formalizing juridical language. Moreover Sartor himself, some years before so wrote:

una logica per la rappresentazione della conoscenza giuridica dovrebbe comprendere comprendere logiche modali, deontiche, epistemiche, temporali, dell'azione, e ogni altra logica necessaria per affrontare i concetti del linguaggio comune²⁴

Perhaps, Computer Law needs of many logics (i.e. modal logics; epistemic logics; tense logics; action logics; and so on), surely of deontic logic too, but not only of itself.

So, deontic logic's formal troubles must not to reject it from the possibility to use itself in Computer Law. It's certainly one element that we must to consider but not the unique. However,

19 Cfr. G. H. VON WRIGHT, *An Essay in Modal Logic*, North – Holland, Amsterdam, 1951, p. 36.

20 Cfr. F. FØLLESDAL – R. HILPINEN, *Deontic Logic: An Introduction*, in R. HILPINEN (ed.), *Deontic Logic: Introductory and Systematic Readings*, D. Reidel Publishing Company, Dordrecht – Holland, 1971, p. 1.

21 Cfr. G. SARTOR, *Informatica giuridica. Un'introduzione*, Giuffrè, Milano, 1996, p. 87. The author thinks of the matter as a hard field in the Computer Law because it makes off numerous and difficult paradoxes, inconsistencies not solvable. Perhaps, the things are not so compromised as long as we re – interpret deontic logic as a metaethic consideration about normative language.

22 Cfr. A. PIZZO, *Deontic Paradoxes and Moral Theory*, Ilmiolibro, Roma, 2012, ISBN: 9788891014184, pp. 35 - 6.

23 Cfr. A. ARTOSI, *il paradosso di Chisholm. Un'indagine sulla logica del pensiero normativo*, Clueb, Bologna, 2000, p. 69: «la logica deontica è una fonte insidiosa e inesauribile di paradossi». Notably, Artosi believes that deontic logic makes ever and dangerously paradoxes. On the other hand, he is in agreement with Hintikka who thinks that deontic logic is source of many paradoxes. See J. HINTIKKA, *Deontic Logic and Its Philosophical Morals*, in J. HINTIKKA, *Models for Modalities. Selected Essays*, Reidel, Dordrecht, 1969, pp. 191 – 2.

24 Cfr. G. SARTOR, *Le applicazioni giuridiche dell'intelligenza artificiale. La rappresentazione della conoscenza*, Giuffrè, Milano, 1990, p. 297.

deontic paradoxes' presence don't imply that the practical thinking is inconsistent²⁵.

Yet, Computer Law has other problems, not this only²⁶. So we come back to our initial question: what can deontic logic can do for Computer Law?

In short, the key question of this matter is the following: deontic logic says to us more than what the law says to us. Is there a more value? According to a several perspective, deontic logic cannot do a lot of than the law because it accounts a theoretical model of the Law, but not more. And the latter is not interesting for the Law, or for its specialists. However, it seems to me that's a good reason to consider the deontic logic with more interest. In fact, deontic logic can to model a formal design of the law, a useful tool for a more understanding of the law. According to an other perspective, deontic logic is relevant for the law because it accounts a rational reconstruction of the Law. I honestly don't think so. Rather deontic logic is interesting for the law but not for this reason. If we want to make a juridical set of law's proposition, then deontic logic is useful in Computer Law, else it doesn't sound in the latter. For instance, Mangiameli considers deontic logic a tool for focusing «il rapporto logico tra i vari tipi di norme»²⁷, a task important for the present matter. In fact, taking care of logical forms' law is one task of the yours.

At last, it seems to me that it is possible ask following question: what can the logic (deontic) can for the law? This question is crucial to the Computer Law too but it is also a topic more complicated than it seems. In fact, in this point, final goal, I think of the logic can offer us a bit of law, but not all. As Haack puts: «Something, but not All»²⁸. So, we can repeat preceding question: what can (not) deontic logic do for the Computer Law? But I leave to others the task of responding.

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M. G. LOSANO, *Giuscibernetica. Macchine e modelli cibernetici nel diritto*, Einaudi, Torino 1969.

25 Cfr. A. PIZZO, *Pensiero pratico e logica deontica: assenza o presenza di razionalità?*, in A. PIZZO, *Logica ... op. cit.*, pp. 93 – 128. The same idea is supported by von Wright: practical thinking is still thinking. How can it be irrational?

26 Cfr. A. PIZZO, *Informatica giuridica: un inventario di problemi*, in A. PIZZO, *Logica ... op. cit.*, pp. 139 – 148. The text contains a list of problematic issues in the Computer Law.

27 Cfr. A. C. A. MANGIAMELI, *Informatica giuridica*, Giappichelli, Torino, 2010, p. 106. In fact, if deontic logic offers a rational account of logical properties between legal proposition, then it is an important tool for the Computer Law because it makes possible to implement legal formulae in computer applications so to make negligible differences between a legal human operator and a legal non – human operator.

28 Cfr. S. HAACK, *On Logic in the Law: “Something, but not All”*, “Ratio Juris”, 1, 2007, p. 1 and so on. It seems to me important to consider A. PIZZO, *Diritto, società e sistemi giuridici. Dall'antropologia del diritto all'informatica giuridica*, in A. PIZZO, *Logica ... op. cit.*, pp. 149 – 164.

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