Łukasz Górski

Automatic processing of legal knowledge. A case study

Doctoral dissertation

Abstract

It is a common observation that in a nearby future a knowledge-based economy (as well as the whole social order) will be influenced by the innovations in the area of knowledge processing to an increasing extent. Such solutions currently lead to ever-increasing degree of algoritmization and automatization. Law is a social phenomenon, so similar processes should affect it as well. Therefore reflections on the applicability of newly-developed technological solutions in the area of law should not be avoided. Currently undertaking of such legal interdisciplinary research (as well as dissemination of its results) finds justification because, even though the legal doctrine has on a number of occasions pointed out the grave consequences of digital revolution, the main area of legal discourse seems to pertain to problems regarding the adaptation of existing legal institutions to the contemporary digital reality. Such reality includes such phenomena, as – *inter alia* – electronic trade or computer crime. There is also ongoing research on the feasibility of new, better-suited regulatory provisions introduction. In comparison, the area of legal informatics that pertains to the problem of automatic legal knowledge processing seems to be a relatively neglected field of inquiry. The developments and breakthroughs made by the researchers working in the area of artificial intelligence and law (AI&Law) are still rather unknown, even though this scientific movement integrates scientists working in the area of law (including Polish legal theorists), as well as those who specialize in linguistics or computer science. In the light of postulates that argue for the introduction of automatic processing in law (for example, in the European order for payment procedure or Polish electronic order for payment) it seems that works linking legal and technological inquiry will be gaining on importance. On the other hand, one has to keep in mind that the research on some technological innovations is not safe from the influence of intellectual fashions. Therefore there exists a need for a research that will tackle the applicability on new technologies in law on the critical and empirical basis. Such technological innovations should not be treated as an universal panacea, but rather an additional tools that are also conditioned by the social needs.

The following thesis belongs to the area of legal informatics and aims to fill the existing knowledge gap. It describes the results and makes conclusions on the basis of contemporary research pertaining to the usage of computational methods in law. It focuses on the

presentation of research that aimed to develop processes for the formalization of legal knowledge that would allow for its further (automatic) processing in the computer system. Methodically, the following work is based on the critical analysis of literature and case-law, as well on the empirical inquiry. As for the latter, conclusions were based on the experiences earned while working on the KR4IPLaw system, a decision support system used to represent patent law knowledge and produce simple reasonings. Those works were in part undertaken on the Berlin's Freie Universität, in a team led by A. Paschke and S. Ramakrishna. This allowed to gain knowledge as for the system's features, as well as its limitations. During this time some new solutions and open problems in the area of legal informatics were also suggested by the thesis author.

The empirical perspective allows one to distance himself from the current intellectual fashions. Contrary to those authors that praise new technologies as an universal panacea, the following work argues for a more nuanced intellectual position. In the area of social order, it is suggested to replace simplistic technological determinism with contemporary sociological theories that assume that the social and technological order are in the constant feedback loop. Methodologically – the work argues that computational methods may prove a worthy additional intellectual tools for a lawyer. Similarly, problems that are encountered in law and the achievements of legal theory should continue to become a source for inspiration and guide the computer scientists. As far as the application aspect goes – whilst researching the feasibility of computerization for legal knowledge processing one should keep in mind that there is a need for cooperation of legal and computer science experts (endorsed by the introduction of proper cooperation procedures). Such cooperation would allow to develop computer systems that answer end users' needs and process knowledge in a way similar to the canons of legal theory. As a *iunctim* that allows for this kind of cooperation, this work suggested and evaluated the feasibility of using controlled natural languages for legal knowledge formalization.

Looking at the technological solutions evaluated in the dissertation prospectively, one should point out their applicability in the light of legislative inflation phenomenon. Computer system that automatically processes legal knowledge, not only legal information, could be used in the legislative proceedings for legislative errors detection (i.e. contradictions) or by introducing unified terminology for the whole legal system. In the area of law application introduction of automatized procedural advisors, that are used by the citizens for explanation of legal areas that are unknown to them seems feasible; moreover, such advisors can be used

as the basis of decision support systems for administration and judiciary – for typical cases, certainly not those that were called *hard cases* by R. Dworkin.