Legal knowledge based systems
JURIX 94
The Relation with Legal Theory

The Foundation for Legal Knowledge Systems
Editors:
H. Prakken
A.J. Muntjewerff
A. Soeteman

H. Prakken, A.J. Muntjewerff, A. Soeteman, *Introduction*, in: A. Soeteman (eds.), Legal knowledge based systems JURIX 94: The Foundation for Legal Knowledge Systems, Lelystad: Koninklijke Vermande, 1994, pp. 13-8, ISBN 90 5458 190 5.

More information about the JURIX foundation and its activities can be obtained by contacting the JURIX secretariat:

Mr. C.N.J. de Vey Mestdagh
University of Groningen, Faculty of Law
Oude Kijk in 't Jatstraat 26
P.O. Box 716
9700 AS Groningen
Tel: +31 50 3635790/5433
Fax: +31 50 3635603
Email: sesam@rechten.rug.nl

 http://jurix.bsk.utwente.nl/

Introduction

The Editors
Amsterdam

1 What is AI and law and what is legal theory?

The theme of JURIX '94 is the relation between AI & Law and legal theory. Both fields deserve some separate words of introduction, although, given the origin of the JURIX conferences, we can be brief about AI & Law. For the present purposes we can describe it as the design and analysis of computational methods for performing or supporting legal reasoning tasks.

Since legal theory is not JURIX' daily concern, this field needs more explanation. In the literature different definitions can be found. Always included are the analysis of fundamental legal concepts (such as norm, duty, permission, right, power), and of legal reasoning, for instance, by developing methods of interpretation and by rationally reconstructing legal, in particular judicial argument. In most definitions legal theory employs what Hart has called and external point of view, i.e. it assumes the legal 'business' as given and comments on it from a metalevel; moreover, these comments are analytical rather than empirical. Others also regard empirical studies of the law as legal theory, for instance, from a sociological or psychological perspective. Again others also count analyses from an internal point of view as legal theory, in which sense it includes legal dogmatics. Finally, legal theory is often (although not always) distinguished from legal philosophy, in the sense that legal theory is more analytical, while legal philosophy is more ideological, studying the concept of justice and other more substantial issues concerning the law.

Although the papers in this volume reflect the variety in definitions of legal theory, most of them interpret it as the analysis from an external perspective of fundamental legal concepts and of legal reasoning. The following two sections therefore will roughly adhere to this interpretation.

2 Why should there be a connection?

Legal theory and AI & Law have much in common: in both fields legal reasoning and legal knowledge representation are important research topics and, moreover, both fields study these issues in the practical context of everyday human discourse, rather than in the highly abstract and idealised setting of mathematics, which is the subject of most of modern formal logic. Because of these shared interests, and since the origins of AI & Law research are of more recent date, many of AI & Law's research questions have already been addressed by legal theory, such as: what reasoning tasks do lawyers perform, how do they perform these tasks, what is the material with which they work, what are the criteria for correct legal decision making, and so on. And indeed, many AI & Law

publications refer to legal theory: for example, in the four international conferences on AI & law that have been organised to date, 62 of the 135 papers, which is 46%, refer to one or more publications of legal theory or philosophy; among the topics that frequently recur are [Hart, 1961]'s discussion of open texture and his related distinction between hard and easy cases, and [Dworkin, 1977]'s question whether law is a system of rules.

Can legal theory also benefit from AI & Law, or is AI & Law just re–inventing the wheel? In our opinion the latter is not the case: although AI & Law focuses on knowledge and reasoning in practical contexts, it does so by using computational and formal tools, and an important advantage of such tools is that they enforce clarity and precision where an informal analysis may leave matters unclear or ambiguous. Legal theorists might counter that in law things cannot be precisely and completely formalised. Although to a certain extent this is certainly true, part of the criticism may nevertheless be caused by a misunderstanding about formal and computational methods. These methods do not presuppose that the law can be completely and unambiguously axiomatised. they do not make uncertain knowledge certain, nor do they make incomplete knowledge complete. On the contrary, they may show more clearly where the knowledge is incomplete, or on which issues opinions differ. And in case of ambiguity, exact methods may show what the alternatives are.

These advantages manifest itself in two ways, to start with, in the exact and unambigous languages that are used, which in particular benefits the analysis of 'static' legal knowledge as found in the legal sources. But these advantages also show themselves in the fact that AI & Law's models of the legal reasoning process can be run on a computer, so that their consequences and flaws can actually be *observed*. And since many models of AI & Law are based on legal theory, AI & Law in effect provides a testing ground for legal– theoretical accounts of legal problem solving.

To illustrate these points, we now turn to a brief historic overview.

3 AI & Law projects interested in legal theory

As already noted, many AI & Law publications refer to legal theory and philosophy. Some only claim to *use* insights from legal theory. A clear example is [Nieuwenhuis, 1989], who uses [Alchourrón & Bulygin, 1971]'s logical model of normative systems in designing a method for testing correctness and consistency of a legal knowledge base.

Other projects addressing topics from legal theory have a more ambitious goal, in that they also want to further analyse and clarify these topics. Thus they explore both sides of the relation between legal theory and AI & Law. Very popular in this respect is [Hart, 1961]'s distinction between easy and hard cases. [Gardner, 1987]'s book has been particularly influential; she describes a computer program that, given a body of possibly inconsistent and incomplete legal material, has to "spot the issues", i.e. to distinguish which cases are easy and which are hard.

Also the role of analogies in legal reasoning, another well studied topic in legal theory, has been the subject of AI & Law research. Here a driving force has been the research of Ashley, Rissland and Skalak (e.g. [Ashley, 1990; Rissland & Ashley, 1987; Skalak & Rissland, 1992]) on modelling the way layers reason with cases and combine the use of cases with the use of rules. Their research has been influenced by American

legal theory, and by Toulmin [Toulmin, 1958].

In logic-oriented AI & Law research two general trends can be distinguished. Some have focused on the defeasibility of legal rules and principles, and on the ways in which layers compare conflicting arguments. Thus they have added to informal insights of e.g. Hart, Fuller [Fuller, 1958], Dworkin and Toulmin on the limits of deductive reasoning in law. In these investigations (for a brief overview, see [Sartor, 1992]) use has been made of AI research on so–called nonmonotonic reasoning, i.e. reasoning with incomplete and uncertain information.

Others have studied legal applications of deontic logic, the branch of logic that formalises notions like 'obligatory', 'permitted' and 'forbidden'. Deontic logic was initially developed by philosophers and most early applications were to moral reasoning. Later also legal theorists became interested, for instance [Lindahl, 1977], who has used deontic logic in developing his theory of normative positions, which formalises aspects of [Hohfeld, 1913]'s well–known scheme of fundamental legal concepts. In AI & Law two projects, [Allen & Saxon, 1986] and [Jones & Sergot, 1992] focus on the further development and implementation of Hohfeld's and Lindahl's ideas.

A final development in AI & Law involving legal theory is the study of formal models of procedural justice in terms of dialogue games. This follows Toulmin's advice that, in order to learn about reasoning in practice, philosophers should turn away from studying the syntactic form of language and focus instead on the proper procedures for handling disputation, as they can primarily be found in law. An example of this development is [Gordon, 1993]'s 'Pleadings game', that is based on [Alexy, 1989]'s discourse theory of legal argumentation; a main thesis of Alexy is that a judicial decision is presumably correct if the procedure by which it was was reached was fair.

4 Legal theorists interested in AI & Law

One might have expected that legal theorists would be excited about a new field of application or testing ground for their ideas. However, so far only a few of them have in fact shown any interest in AI & Law. Those who have, were already interested in the logical aspects of legal reasoning [Allen & Saxon, 1986; Alchourrón & Bulygin, 1971; De Wild, 1986] and have, accordingly, mainly focused on logical issues. We regard it as unfortunate that other legal theorists and philosophers have not also responded to the new challenge. As the historic overview has shown, AI & Law is not only concerned with logical aspects of legal reasoning, but also with many other topics that have always interested legal theorists: the interplay between deduction and reasoning by analogy and distinction, the relation between rules, cases and principles, the procedures for legal disputation, and so on. It would be interesting to see what legal theorists think of the current attempts of AI & Law researchers to address these issues.

5 This volume

In the present volume, many of the points raised above are discussed or illustrated. In his invited paper, Gordon investigates the value of AI & Law for legal theory in some detail. He discusses what some schools of legal philosophy have said on the topic of the limits of judicial discretion. He shows at which points AI & Law, and also general

AI, can clarify the theories of these chools and reveal their shortcomings. In particular, Gordon uses insights on knowledge acquisition, computational complexity and resource bounded reasoning, the limits of deductive reasoning, and computational models of communication and group decision making.

The other invited speaker, Brouwer, approaches the conference theme from the reverse angle. Focusing on legal knowledge representation, he claims that the methods and models of present-day AI & Law research cannot yet stand on their own feet but need support from legal theory. Among other things he discusses the value of the common legal-theoretical idea of a 'deep structure' of law. Behind the surface of 'law fragments' lies a 'complete norm', of which the surface fragments are a partial expression; the deep norm determines the relations between these fragments and thereby defines their meaning. Thus, according to Brouwer, legal-theoretical accounts of the relation between deep and surface structures in the law are a step towards a semantical theory of legal language and as such indispensable for AI & Law.

Den Haan and Winkels take up this challenge. While discussing computerised tools for legislative drafting, they take the distinction between a deep norm and its surface expressions as a starting point. They develop a computational account of the deep structure of legal regulations and show how this structure can be regarded as the intermediate level between the legislator's intentions and the various ways to express these intentions in their 'surface form' in regulations.

Bench-Capon is more sceptical about the value of legal theory for AI & Law, at least for the computer scientist engaged in developing expert systems, who he regards as a practitioner. The prime role he sees for legal theorists in AI & Law is the same as they have in other areas of the law, viz. as commentators on existing practice. From such an a posteriori analysis new guidelines might arise for improving legal expert systems, but that is not the same as stating a priori how legal expert systems should be designed.

Groendijk and Tragter have a different opinion. They claim that in constructing their knowledge–based system in the area of environmental penal law, legal theory has been of much help. This claim is based on a broad interpretation of the term 'legal theory', as also including what legal scholars have said on a particular branch of law, and from an internal point of view.

Also Hamer and Hunter interpret 'legal theory' in a broad sense (albeit implicitly), as also including empirical studies of the law. They discuss research in cognitive psychology on probabilistic reasoning about evidence. Their claim is that the way judicial fact finders actually reason about evidence differs from mathematical theories on probabilities; they discuss the consequences of this claim for legal expert systems that model reasoning about evidence.

Wahlgren discusses the relation between legal theory and AI & Law in a more abstract sense. While arguing for the need of a foundational theory of AI & Law, he claims that, on the one hand, this foundation needs insights from legal theory, since foundational research in general AI has not addressed legal reasoning; but that, on the other hand, legal theory is not sufficient, since it does not address computational issues. He then outlines the requirements that a foundational theory of AI & Law in his opinion should have.

According to Valente and Breuker the most important connection between legal theory and AI & Law concerns 'ontologies' of the law, i.e. conceptual descriptions of the

legal reality. While observing that AI & Law research needs such ontologies, they say that both fields can benefit from each other: legal theory can provide the ontological views of the law needed by AI & Law, while AI & Law can offer a testing ground for these views to legal theory.

Hunter gives a critical analysis of some AI & Law projects involving artificial neural networks. He argues that these projects have not yet lived up to the ambition of modelling interesting aspects of legal reasoning. Part of Hunter's criticism concerns technical aspects but he also takes the perspective of legal theory, thus giving an example of an analysis a posteriori as advocated by Bench-Capon.

The paper by Verhey and Hage is an example of how formal and computational techniques can be used for investigating isssues from legal theory. After identifying some main types of analogical arguments occurring in legal reasoning, they show how these types can be formally reconstructed in their previously developed 'reason-based logic', and in a computer program implementing this logic.

In his individual paper Hage gives a philosophical underpinning of this logic and program. He does so by combining Joseph Raz's theory of the role of reasons in practical reasoning with his own views on the nature of logical consequence. Hage first argues that the validity of arguments should be explained in terms of their effectiveness in persuading audiences to accept their conclusion. Then he describes the role of rules as giving rise to reasons that move the audience in a certain direction. Since different reasons can cause movements in different directions, they have to be weighed to provide a final outcome of a dispute.

Finally, Tan and Torre provide an example of the application of deontic logic to law. Inspired by AI research on diagnostic reasoning, they develop some new techniques for formalizing deontic notions. Their inspiration has been sparked by a parallel between diagnostic and deontic reasoning, in the sense that both have to cope with situations where things are not as they should be.

As this overview shows, the nature of the relation between AI & Law and legal theory is two–sided: some authors use legal theory, either as a guide in developing practical systems, or as a perspective for criticising existing systems, while others contribute to legal theory, by using AI & Law techniques for investigating legal–theoretical issues. So far legal theorists have been largely unaware of these developments but we hope that the present volume and conference will bring about more intensive contacts between scholars from both fields, so that both fields may profit.

References

C. E. Alchourrón and E. Bulygin. *Normative Systems*. Springer-Verlag, Wien, 1971.

Robert Alexy. *A Theory of Legal Argumentation: The Theory of Rational Discourse as Theory of Legal Justification*. PhD thesis, Georg-August University of Göttingen, Oxford, 1989.

L.E. Allen and C.S. Saxon. A–Hohfeld: A Language for Robust Structural Representation of Knowledge in the Legal Domain to Build Interpretation Assistance Expert Systems. In J.-J.Ch. Meyer and R.J. Wieringa, editors, *Deontic Logic in Computer Science. Normative System Specification*. Chichester, Wiley, 1993, 205–224.

K.D. Ashley. *Modeling Legal Argument: Reasoning with Cases and Hypotheticals*. MIT Press, 1990.

R. M. Dworkin. Is law a system of rules? In R.M. Dworkin, editor, *The Philosophy of Law.* Oxford University Press, 1977, 38–65.

L.L. Fuller. Positivism and fidelity to law: a reply to Professor Hart. *Harvard Law Review*, 71, 1958, 630–672.

A. van der Lieth Gardner. *An Artificial Intelligence Approach to Legal Reasoning.* MIT Press, Cambridge MA, 1987.

T.F. Gordon. *The Pleadings Game: An Artificial Intelligence Model of Procedural Justice.* PhD thesis, Technische Hochschule Darmstadt, 1993.

H.L.A. Hart. *The Concept of Law.* Clarendon Press, Oxford, 1961.

W.N. Hohfeld. Fundamental Legal Concepts as Applied in Judicial Reasoning. *Yale Law Journal*, 23, 1913, 16–59.

A. J. I. Jones and M.J. Sergot. Formal Specification of Security Requirements using the Theory of Normative Positions. In Y. Deswarte, G. Eizenberg and J.-J. Quisquater, editors, *Computer Security - ESORICS 92* Lecture Notes in Computer Science 648. Springer Verlag, Berlin-Heidelberg, 1992, 103–121.

L. Lindahl. *Position and Change: a study in law and logic.* Synthese Library. D. Reidel, Dordrecht, Holland, 1977.

M.A. Nieuwenhuis. *TESSEC, een expertsysteem voor de Algemene Bijstandswet.* Kluwer, Deventer, NL, 1989.

E.L. Rissland and K.D. Ashley. A case–based system for trade secrets law. In *Proceedings of the First International Conference on Artificial Intelligence and Law*, Boston, May 1987.

G. Sartor *Artificial Intelligence in Law.* Oslo, Tano, 1992.

D.B. Skalak and E.L. Rissland. Arguments and cases: An inevitable intertwining. *Artificial Intelligence and Law*, 1992, 3–44.

S. Toulmin. *The uses of argument.* Cambridge University Press, Cambridge, 1958.

A.H. De Wild. Computers, logica en recht. *Ars Aequi*, 13, 1986, 714–725. Special issue on 'Rechtsinformatica' (in Dutch).

Acknowledgements

We would like to thank all external referees: J.A. Breuker, P.W. Brouwer, J.C. Hage, R.V. de Mulder, A. Oskamp, D.W.P. Ruiter, J.S. Svensson, R.F. Walker, and M.C.M. Weusten.