20 Years of ICAIL – Reflections on the Field of AI and Law

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Outline

- 20 years of ICAIL
- Are we making progress? Convergence?
- Impact of AI and Law on theory and practice
- The AI and Law community
- Recommendations
- Closing Remarks

20 Years of ICAIL !!

- 1987 Boston
- 1989 Vancouver
- 1991 Oxford
- 1993 Amsterdam
- 1995 College Park, Maryland
- 1997 Melbourne
- 1999 Oslo
- 2001 St Louis
- 2003 Edinburgh
- 2005 Bologna
- 2007 Palo Alto

ICAIL Prehistory 1950s – 1960s Legal Applications of Classical Logic

- Layman Allen. Symbolic logic: A razor-edged tool for drafting and interpreting legal documents; 1957.
- Karl Engisch, Logical Studies on Applying Law; 1960.
- Carlos Alchourron. Logic of Norms; 1969.
- Ilmar Tammelo, Modern Legal Logic. 1969.



ICAIL Prehistory 1970s – Birth of Al and Law

- Bruce Buchanan and Thomas Headrick, Some speculation about artificial intelligence and legal reasoning. Stanford Law Review. 1970
- Jeffrey Meldman. A preliminary study in computer-aided legal analysis. Tech. rep., MIT, Cambridge, MA, 1975.
- Thorne McCarty, Reflections on TAXMAN: An experiment in artificial intelligence and legal reasoning. Harvard Law Review 90, 1977.
- James Sprowl, Automating the legal reasoning process: A computer that uses regulations and statutes to draft legal documents. American Bar Foundation Research Journal, 1979.

ICAIL Prehistory – 1980s

- Ronald Stamper, LEGOL: Modeling legal rules by computer. 1980.
- Carole Hafner; An Information Retrieval System Based on a Computer Model of Legal Knowledge, 1981.
- Thorne McCarty and Sridharan, N. S. A computational theory of legal argument. 1982.
- Edwina Rissland, Examples in the legal domain: Hypotheticals in contract law. 1982.
- Anne Gardner, An Artificial Intelligence Approach to Legal Reasoning. 1984
- Marek Sergot, et al.. The British Nationality Act as a logic program. 1986.

Sprowl; Automating Legal Reasoning for Drafting Legal Documents

1979

Bing; Legal Norms, Discretionary Rules and Computer Programs 1980 Stamper; LEGOL: Modeling Legal Rules by Computer 1980 Fiedler Functional Relations Between Legal Regulations and Software 1980 Martino 1st Logica, Informatica, Diritto Conference Florence 1981 Hafner: An Information Retrieval System Based on a Computer Model of Legal Knowledge 1981 Tammelo; Modern Legal Logic Sergot, et al.; Representing Law 1969 as Logic Programs Buchanon & Headrick; 1982 Speculation about Al and Legal Rissland; Examples in the Legal Reasoning Allen; Symbolic Logic for Drafting Domain 1970 1982 Popp & Schlink; JUDITH McCarty & Sridharan; 1975 Computational Theory of Legal Meldman; Computer-Aided Automation in the Legal World Argument Legal Analysis 1982 1975 Engisch; Logical Studies on Gardner Alchourron, C. Logic of Norms McCarty, Reflections on Taxman Al Approach to Legal Reason 1969 1977 1984 1965

Loevinger Jurimetrics: The next step forward. 1949

Legal Documents

Mehl;

1958

Applying Law

1960

1960

1957

ICAIL 1987 - Boston



AI & Law Highlights: 1987-1988

- Carole Hafner, Conceptual Organization of Case Law
- Edwina Rissland & Kevin Ashley; A Case-Based System for Trade Secrets Law (HYPO)
- Richard Susskind, Expert Systems in Law
- Donald Waterman & Mark Petersen, Expert Systems for Legal Decision Making
- Thomas Gordon; The importance of nonmonotonicity for legal reasoning.

ICAIL 1989 - Vancouver



AI & Law: 1989-1990

- Kevin Ashley; Modeling Legal Argument: Reasoning with Cases and Hypotheticals
- Thorne McCarty; A Language for Legal Discourse (LLD)
- Anja Oskamp, R. F. Walker, J. A. Schrickx, P. H. van den Berg: PROLEXS
- Edwina Rissland & David Skalak; CABARET: Combining Case-Based and Rule-Based Reasoning

ICAIL 1991 – Oxford



AI & Law Highlights: 1991-1992

- Trevor Bench-Capon & Frans Coenen; Isomorphism and LKS
- Karl Branting; Rules and Precedents as Complementary Warrants
- Judith P. Dick: Representation of Legal Text for Conceptual Retrieval
- Daphne Gelbart, J. C. Smith: Beyond Boolean Search: FLEXICON
- Thomas Gordon; An abductive theory of legal issues.
- Graham Greenleaf, Andrew Mowbray, Alan Tyree: The DataLex Legal Workstation
- Peter Johnson & David Mead; LKS for Public Administration
- Andrew Jones & Marek Sergot; Deontic Logic
- Marc Lauritsen; Building Legal Practice Systems

ICAIL 1993 – Amsterdam



AI & Law Highlights: 1993-1994

- Layman Allen and Charles Saxon; Modeling Hohfeldian concepts, e.g. rights, privileges, powers and immunities
- Vincent Aleven and Kevin Ashley; CATO Teaching law students how to use dialectical information to argue effectively with cases.
- Don Berman & Carole Hafner; Teleological Structure: the Missing Link
- Tom Gordon; Pleadings Game Computational Model of Dialectical Legal Procedures
- Jaap Hage: Monological Reason-Based Logic
- Ron Loui, Jeff Norman, et. al; Reasoning with Policy, Precedents and Rationales
- Henry Prakken; Logical Framework for Modeling Legal Argument
- Edwina L. Rissland, David B. Skalak, M. Timur Friedman: BankXX: A Program to Generate Argument Through Case-Base Research

ICAIL 1995 – College Park, Maryland



AI & Law: 1995-1996

- Kathleen Freeman & Arthur Farley; A Model of Argumentation
- Jaap Hage, Ronald Leenes & Arno Lodder; Hard Cases, A Procedural Approach
- Andrew Stranieri, John Zeleznikow, et al.; Split-Up: Hybrid Rule Neural Approach
- Howard Turtle; Text Retrieval in the Legal World
- Henry Prakken & Giovanni Sartor, Dialectical Model of Conflicting Arguments
- Bart Verheij; Rules, Reasons, Arguments
- Haijme Yoshino; Legal Meta-Inference

ICAIL 1997 – Melbourne



AI & Law Highlights: 1997-1998

- Trevor Bench-Capon; Toulmin Dialogue Game
- Karl Branting, James C. Lester, Charles B. Callaway; Automated Drafting of Self-Explaining Documents
- Joost Breuker, Andre Valente, & Radboud Winkels; Legal Ontologies
- Thorne McCarty; Some Arguments About Legal Arguments
- Henry Prakken & Giovanni Sartor, Reasoning with Precedents in a Formal Dialogue Game
- Pepijn Visser & Trevor Bench-Capon; Comparison of Four Ontologies for LKS
- Caroline Uyttendaele, Marie-Francine Moens, et al; Automatic Abstracting of Legal Cases: The SALOMON Experience

ICAIL 1999 – Oslo



AI & Law Highlights: 1999 – 2000

- Trevor Bench-Capon, Geldard & Leng; Dialectical Argument with Argument Games
- Stefanie Brüninghaus, Kevin D. Ashley: Toward adding knowledge to learning algorithms for indexing legal cases
- Jaap Hage; Dialectical Models in AI and Law
- Arno Lodder; Dialogical Models of Argumentation
- Erich Schweighofer, Andreas Rauber, Michael Dittenbach: Automatic text representation, classification and labeling in European law
- Bart Verheij; Argument Assistants
- Gerard Vreeswijk; Formal Disptute with a Standing Order

ICAIL 2001 – St. Louis



AI & Law Highlights: 2001 – 2002

- Trevor Bench-Capon, Henry Prakken, and Giovanni Sartor; Teleological case-based legal reasoning (several papers)
- Alexander Boer, Rinke Hoekstra & Radboud Winkels; METALex : Legislation in XML
- Stefanie Brüninghaus, Kevin D. Ashley: Improving the representation of legal case texts with information extraction methods
- Jack G. Conrad, Daniel P. Dabney: A cognitive approach to judicial opinion structure: applying domain expertise to component analysis.
- Carole Hafner & Donald Berman; Role of Context in Case-Based Legal Reasoning
- Thorne McCarty; Ownership Case Study

ICAIL 2003 – Edinburgh



AI & Law Highlights: 2003 – 2004

- Alexander Artikis, Marek Sergot & Jeremy Pitt; An Executable Specification of an Argumentation Protocol
- Trevor Bench-Capon; Try To See It My Way: Modeling Persuasion in Legal Discourse
- Trevor Bench-Capon & Giovanni Sartor; Legal Reasoning with Cases, Theories & Values
- Alexander Boer, Tom M. van Engers, Radboud Winkels: Using Ontologies for Comparing and Harmonizing Legislation
- Stefanie Brüninghaus, Kevin D. Ashley: Predicting Outcomes of Case-Based Legal Arguments
- Floris Bex, Henry Prakken, Chris Reed & Doug Walton; Argumentation Schemes and Generalizations in Reasoning about Evidence

ICAIL 2005 – Bologna



AI & Law Highlights: 2005 – 2007

- T. Bench-Capon, K.Atkinson and A. Chorley; Persuasion and Value in Legal Argument.
- Guido Governatori, Antonino Rotolo, Giovanni Sartor; Temporalised Normative Positions in Defeasible Logic
- Henry Prakken; AI & Law, Logic and Argument Schemes
- Henry Prakken, Chris Reed, Douglas N. Walton; Dialogues about the burden of proof
- Giovanni Sartor; Legal Reasoning: A Cognitive Approach
- Doug Walton; Argumentation Methods for AI and Law



Convergence?

- Legal Argumentation is the central topic of AI and Law
- Limitations of deductive and inductive logic
- Needed: normative models of argument and dialogue
- Legal philosophy failed to provide the necessary theoretical foundation for our field
- AI and Law, in collaboration with the field of Argumentation in Philosophy, is developing this theoretical foundation.
- A unified theory of legal argument is beginning to emerge, as a result of this collaboration.

Legal Argumentation is our Main Topic

- McCarty & Sridharan; "A Computational Theory of Legal Argument", 1982.
- "Experts can do more with the rules than follow them ... lawyers can argue about the rules themselves." Gardner, 1987.
- Ashley, "Modeling Legal Argument: Reasoning with Cases and Hypotheticals", 1990.
- Prakken; "Logical Tools for Modeling Legal Argument", 1992.
- Loui & Norman; "Rationals and Argument Moves", 1995
- Verheij, "Rules, Reasons, Arguments", 1996
- Bench-Capon, et al.; "Dialectical Argument with Argument Games", 2000.

The Modern Field of Argumentation in Philosophy is a Contemporary Development



Basic Elements of the Unified Theory of Argument

- Argumentation Schemes
 - Argument from Rules
 - Argument from Cases
 - Argument from Ontologies
 - Argument from Evidence
 - Argument from Purpose and Policy
 - Argument from Values
- Dialogue Types and their Protocols
 - Administrative Procedures
 - Pleading, Trial
 - Appellate Court Proceedings
 - Arbitration
 - Negotiation
 - Deliberative Democracy (eParticipation)

Argumentation Tasks



Scientific Impact of AI and Law

- Only Anecdotal Evidence !!
- Impact on Philosophy
- Impact on AI
- Impact on Legal Theory

Impact of AI and Law on Philosophy

- Prakken, H. and G. Vreeswijk, 2001. "Logical Systems for Defeasible Argumentation." In D. Gabbay and F. Guenthner, eds, Handbook of Philosophical Logic
- Verheij, Bart, "Automated Argument Assistance for Lawyers." ICAIL-1999
- Doug Walton often cites AI and Law research in his books on argumentation.



Impact of AI and Law on Artificial Intelligence Research?

- Russel & Norvig, the leading textbook on AI:
 - Contains few references to the AI and Law literature
 - Does not cover computational models of argumentation
 - Uses only probability theory to model reasoning under uncertainty
- Artificial Intelligence Journal
 - Special Issue on AI and Law (2003)
 - Special Issue on Argumentation (2007)
 - 5/12 articles by ICAIL authors, including 4 ICAIL presidents



Impact of AI and Law on Legal Theory



A Treatise of Legal Philosophy and General Jurisprudence Volume 1:The Law and The Right; Volume 2: Foundations of Law, Volume 3: Legal Institutions and the Sources of Law, Volume 4: Scientia Juris, Volume 5: Legal Reasoning Volume package A Treatise of Legal Philosophy and General Jurisprudence Pattaro, E., Rottleuthner, H., Shiner, R.A., Peczenik, A., Sartor, G. 2005, XCVIII, 1958 p., 16 illus., Hardcover ISBN: 978-1-4020-3387-2

Practical Impact of AI and Law

- Rule-Based Systems for Public Administration
- Legal Document Assembly
- Information Retrieval

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RuleBurst one of ten companies globally selected for Microsoft Business Process Alliance (27 Feb 2007)

RuleBurst announces that SAP endorses its rules based engine technology (6 Feb 2007)

RuleBurst 8.5 released (1 Nov 2006)

RuleBurst wins US\$1.68m IRS contract (20 Sep 2006)

Legal Document Assembly

"Corporate law departments are starting to show great interest in document automation for client self-service. Cisco and Microsoft, for instance, now provide do-ityourself sales contracts, non-disclosure agreements, and software licenses to their business users. ...

Now large international law firms sell subscriptions to online expert systems that deliver sophisticated legal analysis ..."

Marc Lauritsen, 2007

Legal Information Retrieval

- Westlaw applies probabilistic reasoning methods (Bayesian Networks) and Natural Language Processing (NLP) in its full text legal information system. [Turtle, AI and Law Journal, 1995]
- Lexis/Nexis now has a similar features, with its FREESTYLE system (source: Schweighofer, 1999)
- The Semantic Web is creating a great opportunity for Conceptual Retrieval methods.

The AI and Law Community

- Interdisciplinary Makeup
- Vitality of the Community
- Issues





Growth of the AI & Law Community



Institutional Problems with the Field of AI and Law

- Interdisciplinary fields like AI and Law have weak institutional support
 - Lawyers working in AI and Law tend to drift to computer science departments
 - Graduate students at computer science departments tend to drift away from the AI and Law field
- Al and Law impact on legal education and practice is not optimal
 - Law schools courses on legal philosophy, jurisprudence, legal theory, legal methods or legal research and writing are typically not informed by AI and Law results.

Legal Theory at Law Schools Needs Greater Funding and Staff, But ...

- Law schools are professional schools and practice-oriented
- Law is traditionally taught as an art or craft, with little attention to theoretical or methodological foundations
- Legal philosophy, theory and methods are not part of the core curriculum
 - Course offerings on legal theory and related topics are sporadic and unsystematic
 - The courses are optional and very few students elect to take them
- Chicken and egg problem
 - Legal theory must demonstrate its practical relevance to obtain greater resources
 - Legal theory needs greater and sustained resources to produce practical results

Collaboration Model for Law and Computer Science Departments



Recommendations for the AI and Law Field

- Research on Legal Theory needs to be driven by task requirements of law students, practicing lawyers and developers of legal information technology
- Al and Law needs to consolidate its results
 - Unified theory of legal argumentation
 - Open architecture for AI and Law system, with standard APIs and interchange formats
 - More sharing of content (models of legal sources, test cases) and code (components)
 - A shared repository of AI and Law resources, like Source Forge for Open Source software
- New textbooks on legal methods, informed by the state of the art of AI and Law, are needed, primarily for law students

The Central Role of Legal Models for eGovernance



Application Opportunities for Demonstrating Practical Relevance

- eGovernment Rule Based Systems for Public Administration
- Corporate Governance Business Rules
- Regulatory Compliance
- Deregulation and "Better Regulation".
- eDemocracy / eParticipation
- Model-Driven Legislative Drafting
- Semantic Web
- Bottom Line: Focus first on providing solutions for private companies with deep pockets and a willingness to innovate. Law professionals tend not to be early adopters of new technology.

Illustration of the Need for Legal Knowledge Systems

- A2LL: Software for the German federal government, for determining rights to unemployment benefits
- Software development costs: over 90 million Euros and rising; 50 million Euros were planned
- Personnel: 160 programmers
- Quality: Buggy and incomplete
- Damage: Over 28 million Euros

Closing Remarks

- Reinterpreting the purpose and goals of AI and Law
- On the need for vision, endurance and patience
- On the importance of our work



Goals of Artificial Intelligence

Empirical	Normative	
Systems that think like humans	Systems that think rationally	Think
Systems that act like humans	Systems that act rationally	Act

On the Need for Endurance and Patience

- It took 20 years for rule-based legal expert systems to become established ... and they are still not widespread.
- It may take another 20 years for more advanced AI and Law method to succeed (CBR, conceptual retrieval, argumentation systems)
- We are tackling difficult problems which philosophy has failed to solve in over 2000 years.
- Non-deductive forms of reasoning have been largely neglected since the ancient Greeks.
- Only since the late 1950s, with the birth of the fields AI and Informal Logic, has work begun again in earnest.

The Importance of AI and Law

- The quality of legal practice will remain uncertain, without advances in Legal Theory providing normative standards for legal reasoning and argumentation
- Empirical evidence suggests that clerks in public agencies incorrectly apply the law in circa 30% of all cases.
- Between 1960 and 2000 the US Code of Federal Regulations grew from 20,000 to 140,000 pages.
- Al and Law research is urgently needed to assure the performance of legal tasks can be efficient, fair, transparent, and legally correct in the face of this growing complexity.