

AI & Law: A Brief History

Key Research & Milestones

Jack G. Conrad
TR Labs -- Applied Research
Int'l Conference on Data Science & Management of Data
CODS-COMAD '23
Wednesday, 4 January 2023

Outline

AI & Law: A Brief History of Key Research & Milestones

- Background
- Foundations of the Research Community
- Overview of Field
 - Sketch of 30 Years of AI and Law
 - The Role of Legal Startups
- From Past to Present
 - Some Comparisons
- A Look to the Future
 - What will next generation capabilities look like?

AI and Law – Foundations of the Research Community

The AI and Law Journal

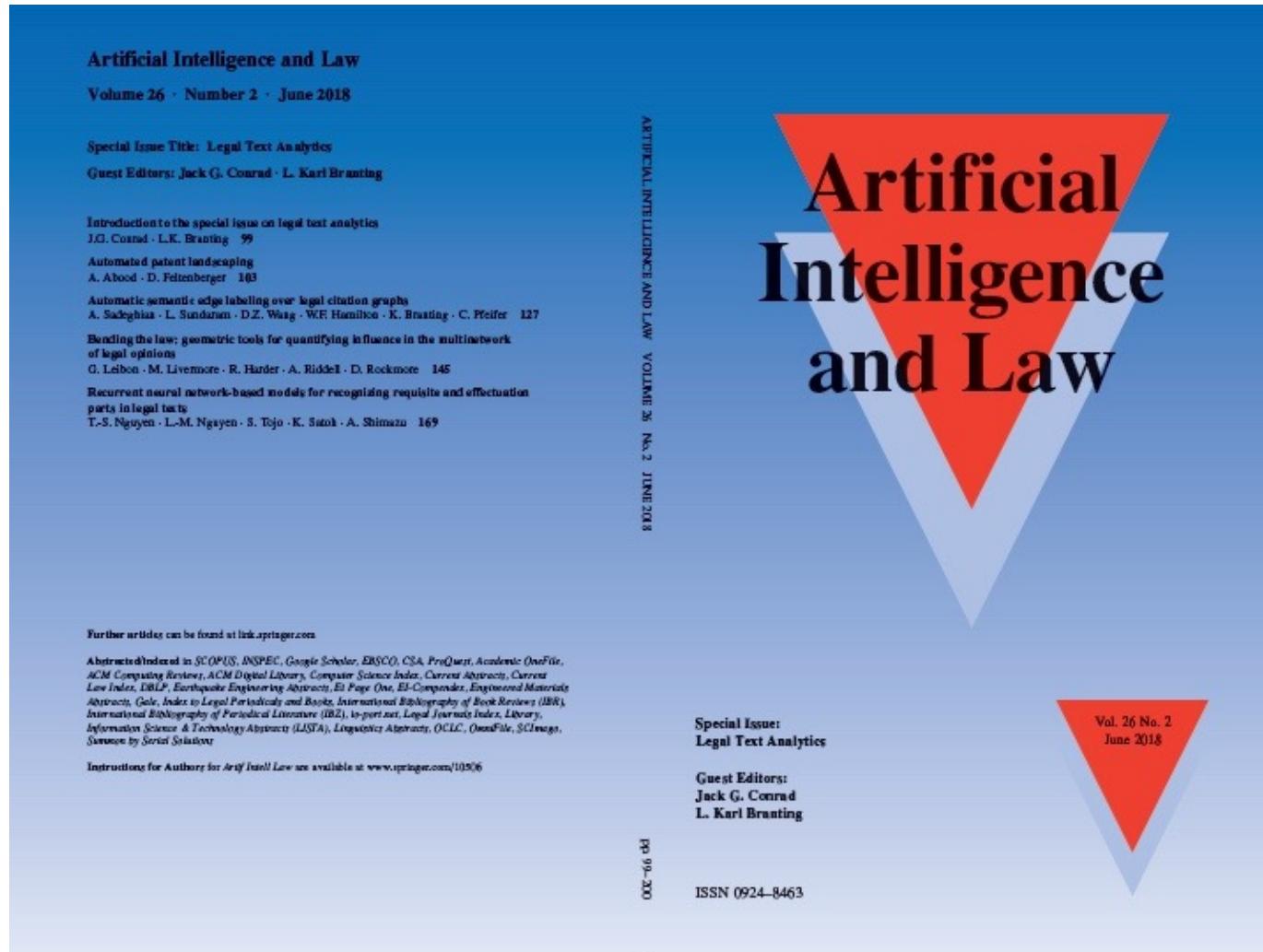
Established in 1992

Editors

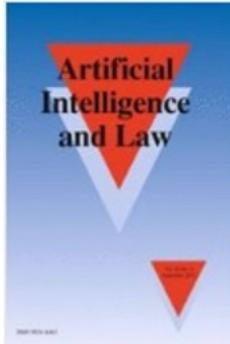
- Kevin L. Ashley
- Trevor Bench-Capon
- Giovanni Sartor

Extensive Editorial Board
with specialists covering a
broad range of topical
research areas.

Published by Springer (NL)



Key Issue – Reviewing 30 years of research papers in the journal (divided into 3 decades)



Open Access | Published: 09 August 2022

Thirty years of *artificial intelligence and law: the third decade*

[Serena Villata](#), [Michał Araszkiewicz](#), [Kevin Ashley](#), [Trevor Bench-Capon](#)✉, [L. Karl Branting](#), [Jack G. Conrad](#) & [Adam Wyner](#)

[Artificial Intelligence and Law](#) **30**, 561–591 (2022) | [Cite this article](#)

2778 Accesses | 3 Citations | 9 Altmetric | [Metrics](#)

Abstract

The first issue of *Artificial Intelligence and Law* journal was published in 1992. This paper offers some commentaries on papers drawn from the Journal's third decade. They indicate a major shift within Artificial Intelligence, both generally and in AI and Law: away from symbolic techniques to those based on Machine Learning approaches, especially those based on Natural Language texts rather than feature sets. Eight papers are discussed: two concern the management and use of documents available on the World Wide Web, and six apply machine learning techniques to a variety of legal applications.

The AI and Law Journal

Key Issue – Reviewing 25 years of ICAIL research papers (3-4 papers per year)



Artificial Intelligence and Law
September 2012, Volume 20, [Issue 3](#), pp 215–319 | [Cite as](#)

A history of AI and Law in 50 papers: 25 years of the international conference on AI and Law

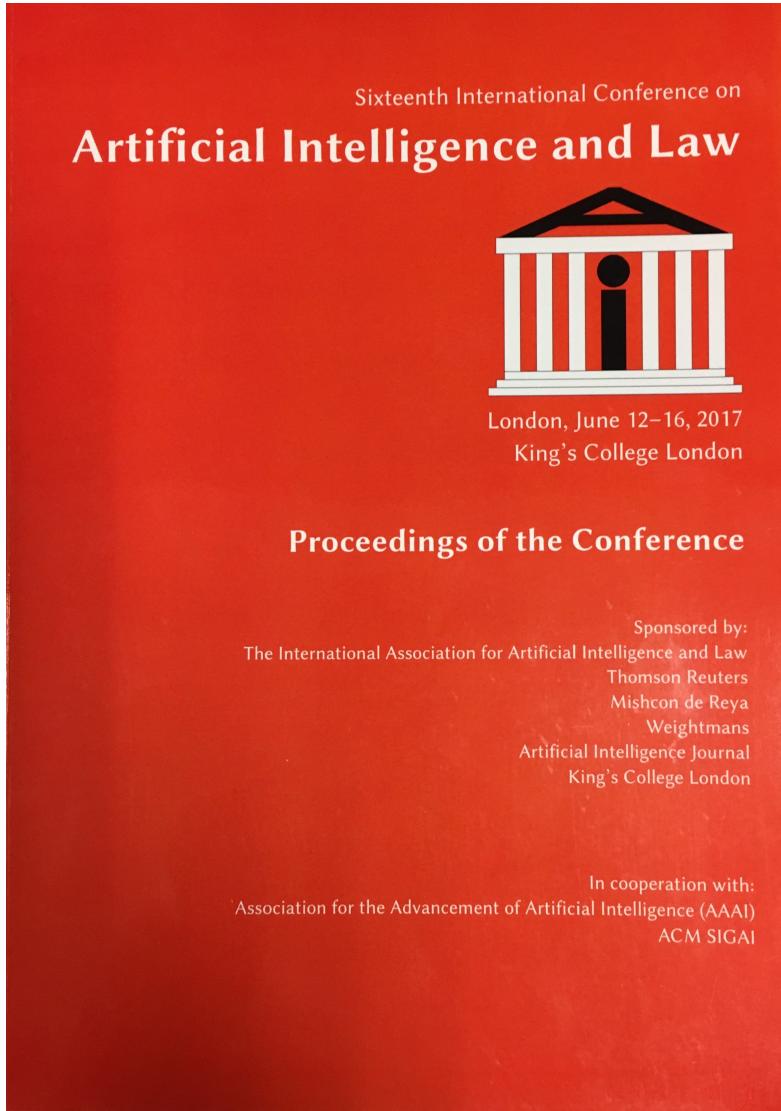
[Authors](#) [Authors and affiliations](#)

Trevor Bench-Capon [✉](#), Michał Araszkiewicz, Kevin Ashley, Katie Atkinson, Floris Bex, Filipe Borges, Daniele Bourcier, Paul Bourgine, Jack G. Conrad, Enrico Francesconi, Thomas F. Gordon, Guido Governatori, Jochen L. Leidner, David D. Lewis, Ronald P. Loui, L. Thorne McCarty, Henry Prakken, Frank Schilder, Erich Schweighofer, Paul Thompson, Alex Tyrrell, Bart Verheij, Douglas N. Walton, Adam Z. Wyner, [show less](#)

Article
First Online: 29 September 2012

4	3.9k	15
Shares	Downloads	Citations

ICAIL: Proceedings of the Int'l Conference on AI and Law – Latest Issue 2021



- From the biennial conference
- Print + Digital versions
- Accessible from the ACM Digital Library
- Full length, short and demo papers
- Introduction from PC Chairs
- Listings of workshops
- Hosted by IAAIL.org (more anon)

ICAIL: Proceedings of the Int'l Conference on AI and Law – 18 + counting

ICAIL 2015

The Fifteenth International Conference on Artificial Intelligence and Law
Location: University of San Diego School of Law
Program Chair: Katie Atkinson, University of Liverpool, UK
Conference Chair: Ted Sichelman, University of San Diego School of Law
Website: <http://sites.sandiego.edu/~ley/db/conf/icail/icail2015.html>
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2015.html>

ICAIL 2013

The Fourteenth International Conference on Artificial Intelligence and Law
Location: National Research Council (CNR) of Italy, Rome
Program Chair: Bart Verheij, University of Groningen, The Netherlands
Conference Chair: Enrico Francesconi, ITTIG-CNR, Italy
Website: <http://icail2013.ittig.cnr.it>
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2013.html>

ICAIL 2011

The Thirteenth International Conference on Artificial Intelligence and Law
Location: University of Pittsburgh School of Law, Pittsburgh, PA
Program Chair: Tom van Engers, Leibniz Center for Law, University of Amsterdam, The Netherlands
Conference Chair: Kevin Ashley, University of Pittsburgh School of Law
Website: <http://www.law.pitt.edu/events/2011/06/icail-2011-the-thirteenth-interna...>
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2011.html>

ICAIL 2009

The Twelfth International Conference on Artificial Intelligence and Law
Location: Autonomous University of Barcelona
Program Chair: Carole D. Hafner, College of Computer and Information Science, Northeastern University, Boston
Conference Chair: Pompeu Casanovas, Institute of Law and Technology, Autonomous University of Barcelona
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2009.html>

ICAIL 2007

The Eleventh International Conference on Artificial Intelligence and Law
Location: Stanford Law School, Stanford, California
Program Chair: Radboud Winkel, Leibniz Center for Law, University of Amsterdam, The Netherlands
Conference Chair: Anne Gardner, Atherton, California
Website: <http://www.iaail.org/past-icail-conferences/icail2007/index.html>
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2007.html>

ICAIL 2005

The Tenth International Conference on Artificial Intelligence and Law
Location: University of Bologna
Program Chair: Anne Gardner, Atherton, California
Conference Chair: Giovanni Sartor, University of Bologna
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2005.html>

ICAIL 2003

The Ninth International Conference on Artificial Intelligence and Law
Location: University of Edinburgh
Program Chair: Giovanni Sartor, University of Bologna
Conference Chairs: John Zeleznikow (The Edinburgh Law School, University of Edinburgh) and Lillian Edwards (The Edinburgh Law School, University of Edinburgh)
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2003.html>

ICAIL 2001

The Eighth International Conference on Artificial Intelligence and Law
Location: Washington University, St. Louis, MO
Program Chair: Henry Prakken, Department of Information and Computing Sciences, Utrecht University, The Netherlands
Conference Chair: Ronald P. Loui, Department of Computer Science, Washington University, Saint Louis, MO
Website: <http://www.iaail.org/past-icail-conferences/icail2001/index.html>
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail2001.html>

ICAIL 1999

The Seventh International Conference on Artificial Intelligence and Law
Location: University of Oslo, Norway
Program Chair: Thomas F. Gordon, GMD, Germany
Conference Chair: Jon Bing, NRCL (Norwegian Research Center for Computers and Law) and Andrew J. I. Jones, University of Oslo
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail1999.html>

ICAIL 1997

The Sixth International Conference on Artificial Intelligence and Law
Location: University of Melbourne Law School
Program Chair: L. Karl Branting, University of Wyoming
Conference Chair: John Zeleznikow (La Trobe University, Australia) and Dan Hunter (University of Melbourne, Australia)
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail97.html>

ICAIL 1995

The Fifth International Conference on Artificial Intelligence and Law
Location: University of Maryland, College Park, MD
Program Chair: Trevor Bench-Capon, Department of Computer Science, University of Liverpool
Conference Chair: L. Thorne McCarty, Department of Computer Science, Rutgers, The State University of New Jersey
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail95.html>

ICAIL 1993

The Fourth International Conference on Artificial Intelligence and Law
Location: Vrije Universiteit, Amsterdam
Program Chair: Kevin Ashley, School of Law, University of Pittsburgh
Conference Chair: Anja Oskamp, Open Universiteit, the Netherlands
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail93.html>

ICAIL 1991

The Third International Conference on Artificial Intelligence and Law
Location: St Catherine's College, University of Oxford
Program Chair: Marek Sergot, Department of Computing, Imperial College London
Conference Chair: Richard Susskind, Masons, UK
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail91.html>

ICAIL 1989

The Second International Conference on Artificial Intelligence and Law
Location: University of British Columbia, Vancouver
Program Chair: Edwina L. Rissland, Department of Computer Science, University of Massachusetts
Conference Chairs: J. C. Smith and Robert T. Franson (University of British Columbia)
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail89.html>

ICAIL 1987

The First International Conference on Artificial Intelligence and Law
Location: Northeastern University, Boston, MA
Program Chair: L. Thorne McCarty, Department of Computer Science, Rutgers, The State University of New Jersey
Conference Chair: Carole D. Hafner, Northeastern University, Boston
Bibliography: <http://www.informatik.uni-trier.de/~ley/db/conf/icail/icail87.html>

Does IAAIL Support Regional Conferences?

Europe – each November or December

Originated in the Netherlands



The image shows the JURIX logo, which consists of a circular seal with the text "Foundation for Legal Knowledge Based Systems" around the top and "JURIX" in the center. Below the logo is the word "JURIX" in large, bold, serif capital letters, followed by the subtitle "The Foundation for Legal Knowledge Based Systems". To the right of the logo is a photograph of a laptop keyboard and a blurred image of people in what appears to be a conference setting. On the left side of the image, there is a white rectangular overlay containing text about the JURIX 2022 conference.

JURIX 2022

35th International Conference on Legal Knowledge and Information Systems

December 14-16, 2022

The conference will be held in Saarbrücken, Germany

MUNI CZECH TECHNICAL UNIVERSITY IN PRAGUE

Asia – each autumn

Typically hosted in Japan

JURISIN

Sixteenth International Workshop on Juris-informatics (JURISIN 2022)

COLIEE – Competition on Legal Information Extraction and Entailment

- Held every year
 - With ICAIL or with JURISIN, depending on year
 - Generally ~5 tasks involving case or statute retrieval and entailment, legal question answering, etc.
 - Tasks can be using Japanese or English (translation) texts

ICAIL: Workshops covering latest trends in AI and Law

List of Workshops from ICAIL 2019



[Tutorial - Introduction to AI & Law](#)

[Tutorial - Defeasible Logic for Normative Reasoning](#)

[Doctoral Consortium](#)

[2nd Workshop on AI in Legal Practice](#)

[1st Workshop on AI vs. Intelligent Assistance for Legal Professionals
in the Digital Workplace \(LegalAlIA\)](#)

[LegRegSW 2019: A Workshop on a Legislation and Regulation
Semantic Web – a shared corpus task](#)

[1st Workshop on Artificial Intelligence and the Administrative State](#)

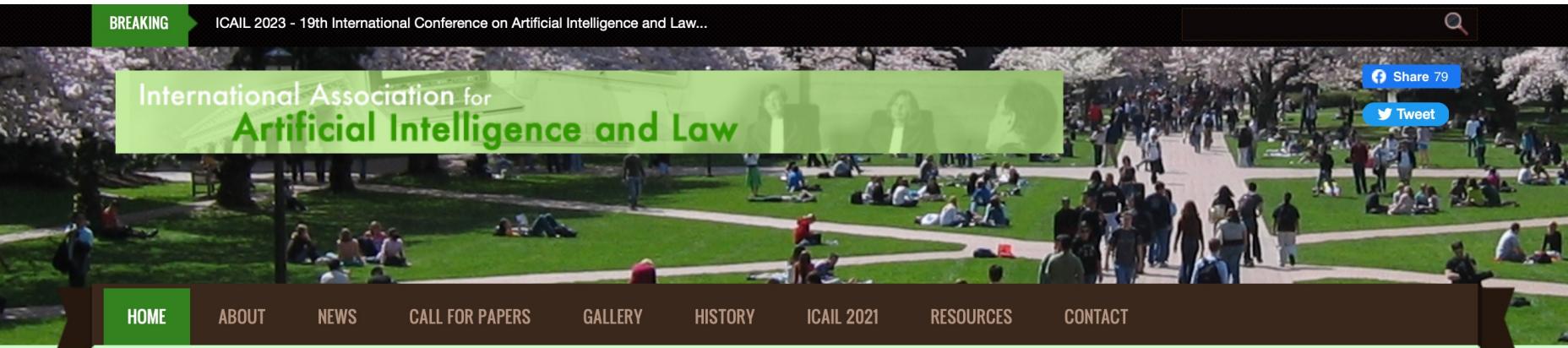
[ASAIL 2019: Third Workshop on Automated Detection, Extraction and
Analysis of Semantic Information in Legal Texts](#)

[Competition on Legal Information Extraction and Entailment \(COLIEE
2019\)](#)

[2nd MWAIL: Multilingual Workshop on AI & Law research
Tutorial - Automated Deduction with Legal Texts](#)

What Organization Hosts ICAIL?

IAAIL.org : International Association for Artificial Intelligence and Law



BREAKING ICAIL 2023 - 19th International Conference on Artificial Intelligence and Law...

Share 79 Tweet

International Association for Artificial Intelligence and Law

HOME ABOUT NEWS CALL FOR PAPERS GALLERY HISTORY ICAIL 2021 RESOURCES CONTACT

ICAIL 2023 - 19TH INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND LAW - CALL FOR PAPERS, DEMONSTRATIONS, WORKSHOPS AND TUTORIALS

Submitted by iaail on Fri, 07/29/2022 - 14:02

June 19-23, 2023

Hosted by:

Universidade do Minho, Braga, Portugal

Universidade do Minho Law School with JUSGOV – Research Center for Justice and Governance, Centro Algorítmico and LASI – Laboratório Associado de Sistemas Inteligentes
Conference Website: <https://icail2023.di.uminho.pt>

Tags: Call for Papers

READ MORE

JURIX 2022 - CALL FOR WORKSHOP AND TUTORIALS OF THE 35TH INTERNATIONAL CONFERENCE ON LEGAL KNOWLEDGE AND INFORMATION SYSTEMS

Submitted by iaail on Wed, 07/27/2022 - 10:14

Besides the standard conference track and the Doctoral Consortium, JURIX 2022 will host a number of workshops and tutorials related to the theme of the conference.

Workshops provide an informal setting where participants have the opportunity to discuss specific

ICAIL 2023 WILL BE HELD IN BRAGA, PORTUGAL

The next International Conference on AI and Law (ICAIL 2023) will be organized by the University of Minho, Braga, Portugal

FEATURED VIDEOS



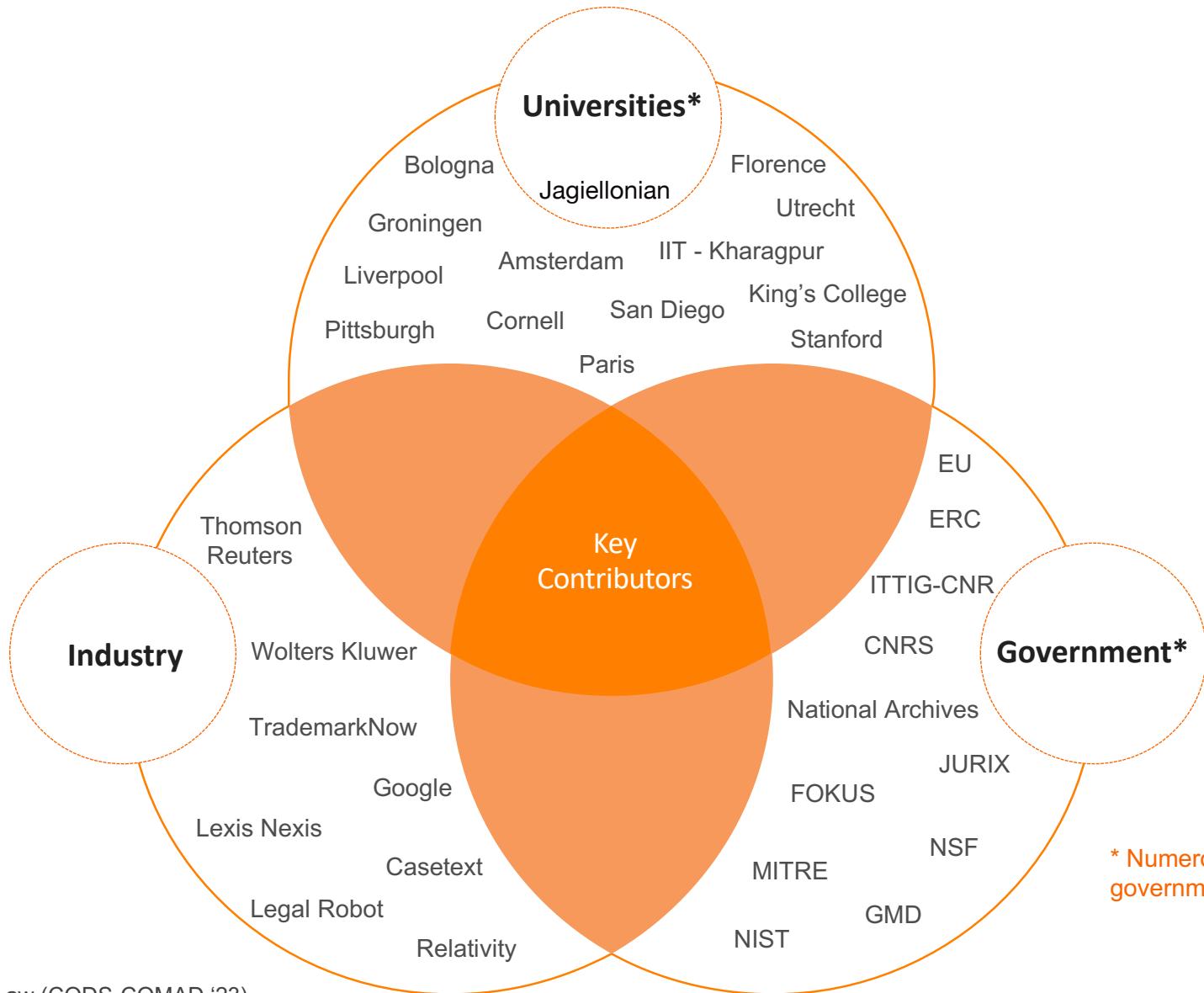
ICAIL 2021 - Great Opening

LATEST PHOTOS



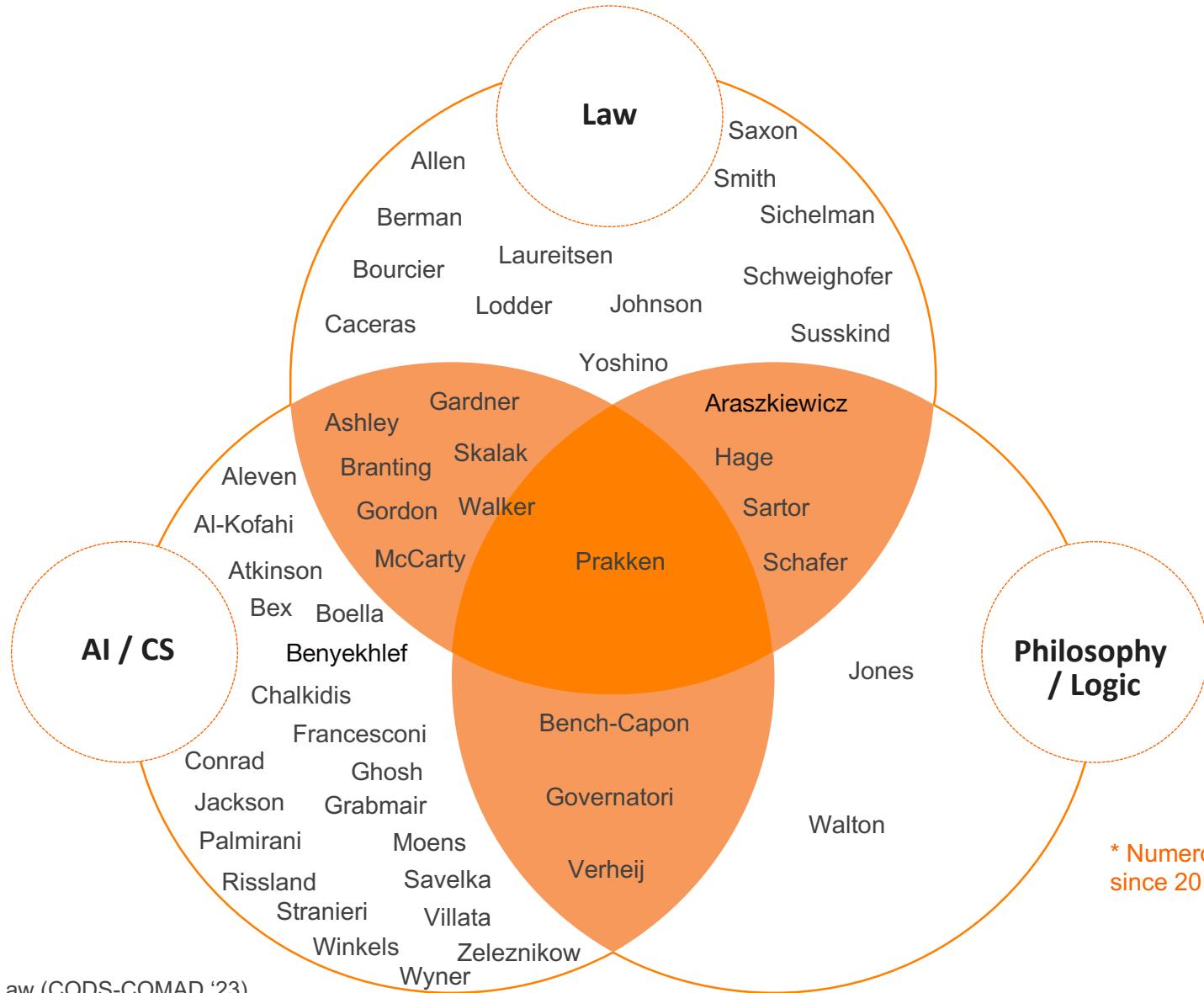
The Community and the Conference (IAAIL and ICAIL)

Demographics

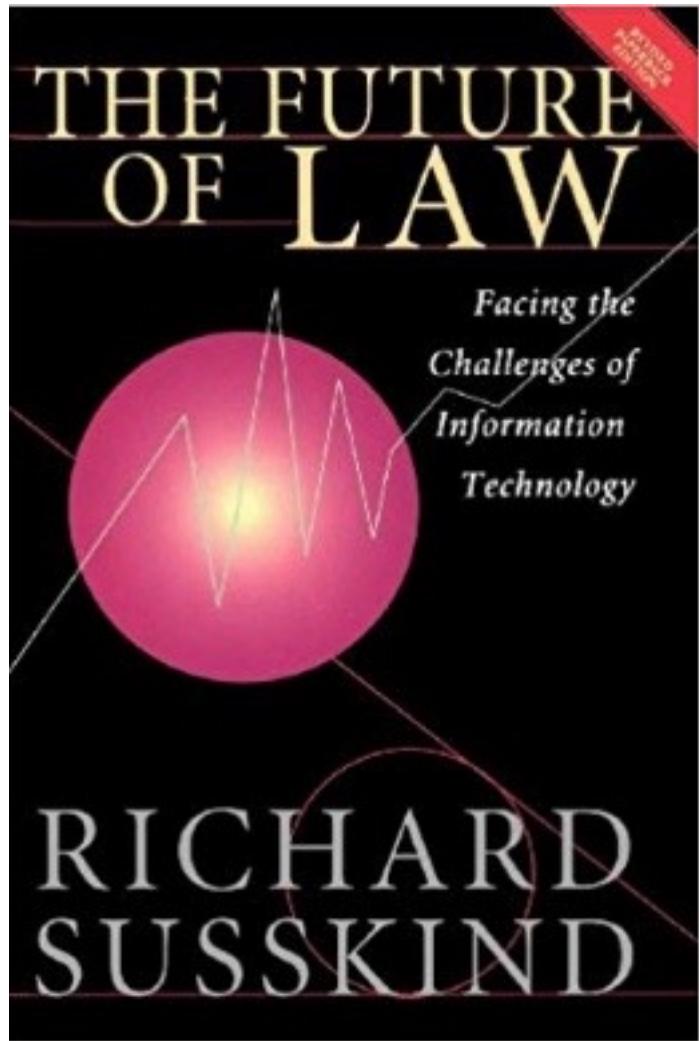


The Community and the Conference (IAAIL and ICAIL)

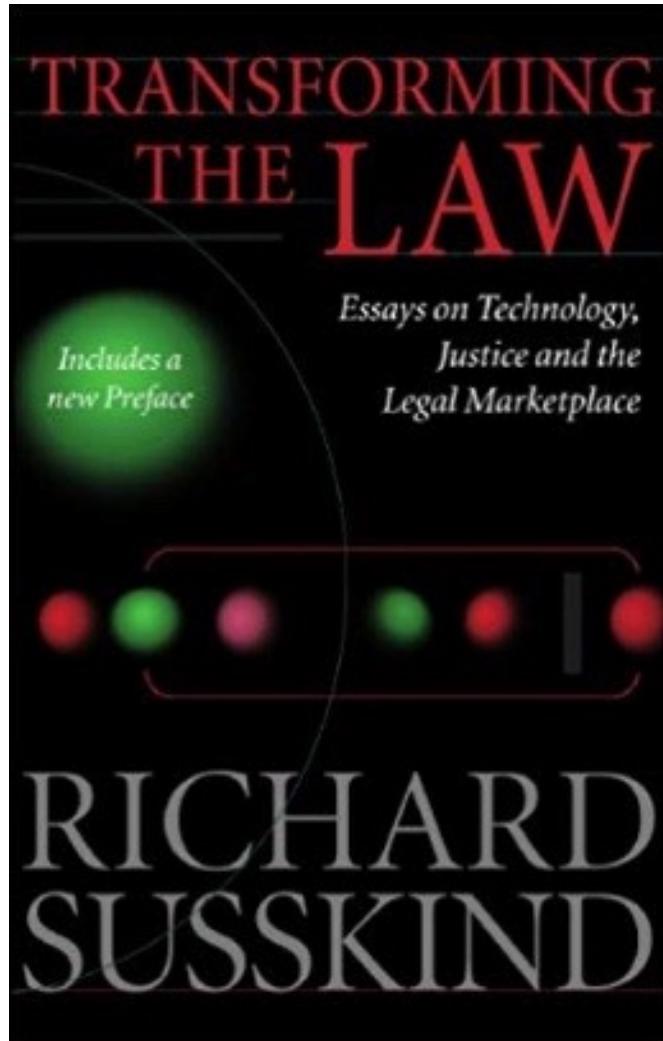
Demographics



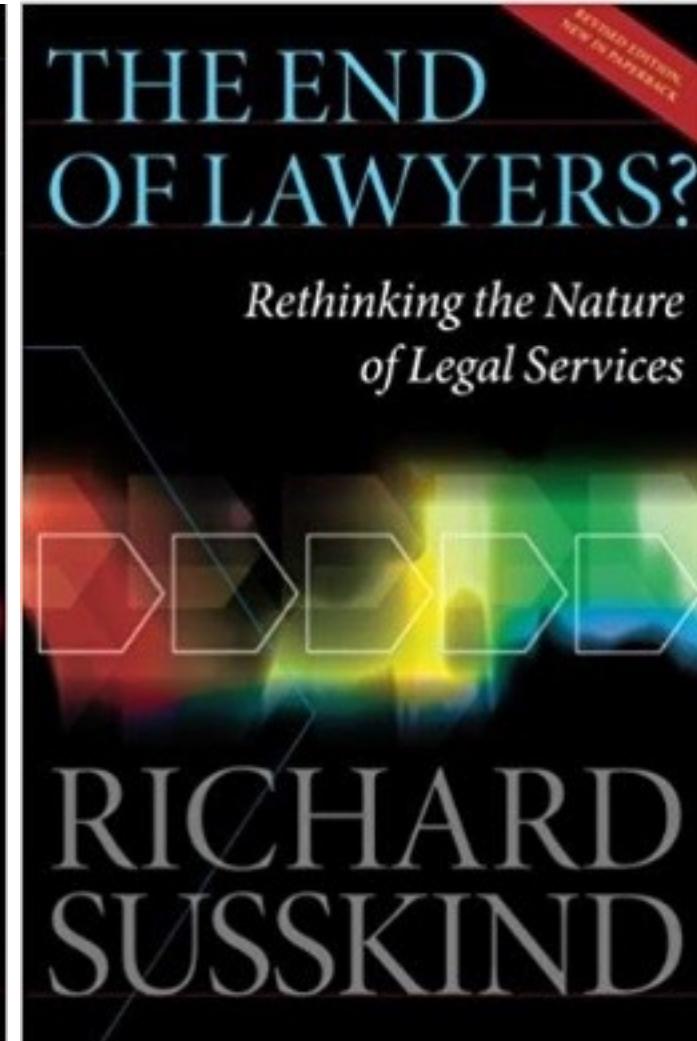
Richard Susskind and AI & Law



1996



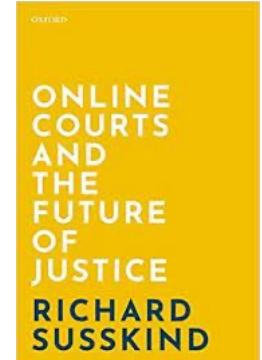
2000



2010



- Legal Services Visionary
- Author, Lecturer
- Advisor to Lord Chief Justice
- AI & Law Consultant



2019

Noteworthy Early AI & Law Events

Among the earliest newsworthy activities in the community (1971 – 73)

TAXMAN

L. Thorne McCarty

- Work on project began while author was a Law and Computer fellow at Stanford Law School (1971-73), and supported by a grant from the IBM Corporation.
- Additional work was undertaken during a workshop at Stanford Law School in 1975
- Computer time for the project was provided by the Stanford Artificial Intelligence Laboratory
- The work introduced some novel ways of computer-based semantic processing developed in the field of Artificial Intelligence
- McCarty describes a computer program that uses techniques that enables a computer to apply certain fact situation concepts in the area of corporate reorganization taxation
- He considers both the limitations of the program and the means by which it may be feasibly improved
- He further argues that if developed further, by means of increasingly sophisticated techniques, it may prove of practical use to a lawyer

VOLUME 90

MARCH 1977

NUMBER 5

HARVARD LAW REVIEW

REFLECTIONS ON TAXMAN: AN EXPERIMENT
IN ARTIFICIAL INTELLIGENCE AND
LEGAL REASONING †

L. Thorne McCarty *

After introducing some basic techniques of semantic information processing developed in the field of artificial intelligence, Professor McCarty describes a computer program using such techniques which enables a computer to apply to certain fact situations concepts of the area of the taxation of corporate reorganizations. He considers both the present limitations of the program and ways in which it might feasibly be improved, and argues that if developed further by means of increasingly sophisticated techniques, it may prove of practical use to tax lawyers. The development of such computer models also has a dual theoretical purpose. It clarifies the structure of the area of law modeled, and the investigation of the limits of such models provides the foundation for a theory of the nature of legal concepts.

30 Years of AI and Law

AI & Law in the 1980's

As represented by ICAIL (1987, 1989)



AI & Law in the 1980's

As represented by ICAIL (1987, 1989)

Dominant Research Themes

- Information Retrieval
 - Emphasis: Conceptual IR
- Expert Systems
- Case-Based Reasoning
- Logic Programming
 - As means of implementing a research system

AI & Law in the 1990's

As represented by ICAIL (1991, 1993, 1995, 1997, 1999)



AI & Law in the 1990's

As represented by ICAIL (1991, 1993, 1995, 1997, 1999)

Dominant Research Themes

- Legal Knowledge-Based Systems (LKBS)
- Case-Based Reasoning
- Expert Systems
- Conceptual IR
- Logic Programming
- Neural Networks

Other Research Themes

- Legal Tutoring Systems (for Law students)
- Legal Support Systems
- Question Answering
- Opinion Classification

AI & Law in the 2000's

As represented by ICAIL (2001, 2003, 2005, 2007, 2009)



AI & Law in the 2000's

As represented by ICAIL (2001, 2003, 2005, 2007, 2009)

Dominant Research Themes

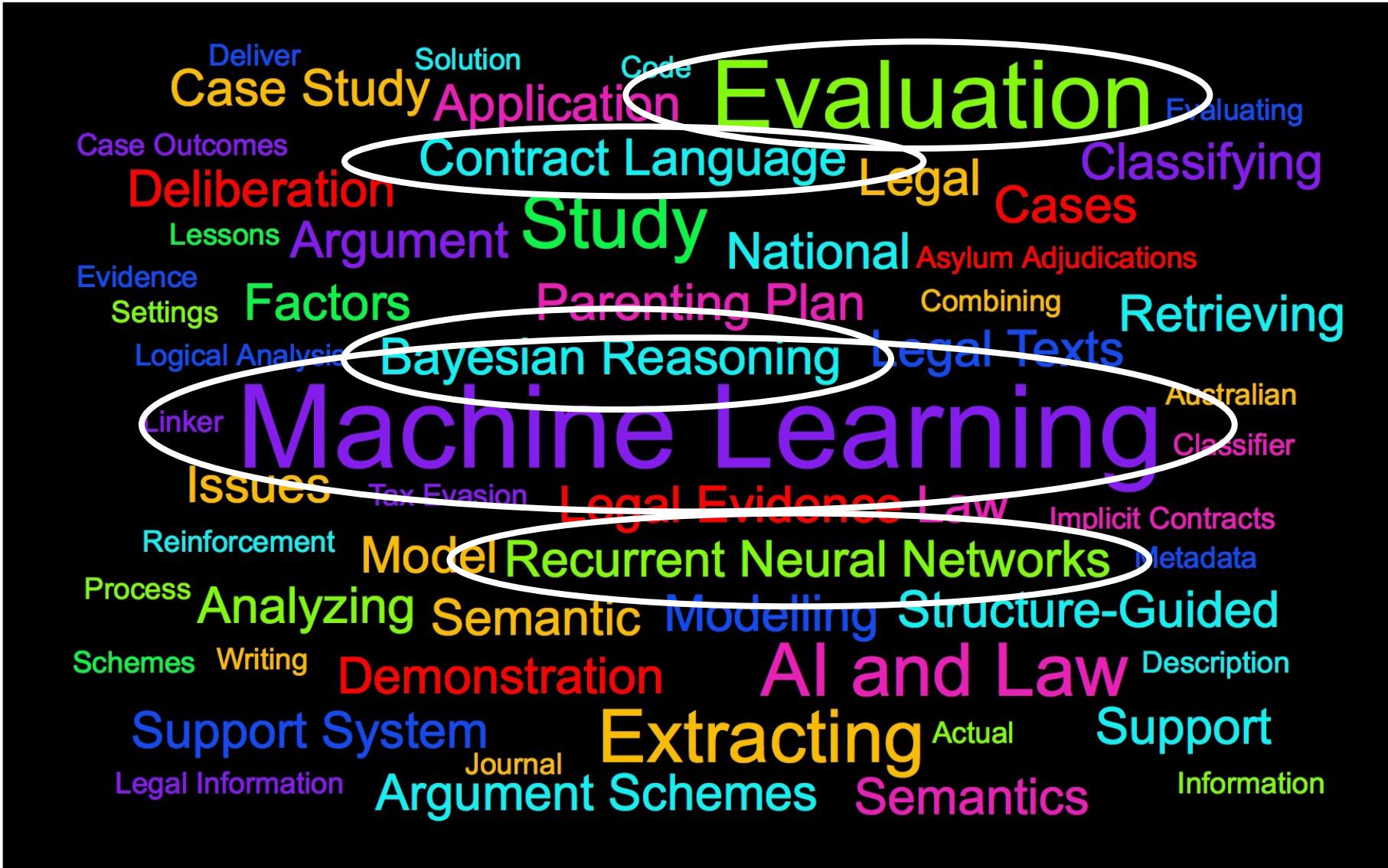
- Information Retrieval (Legal Search)
 - XML-Based Retrieval Systems
 - E-Discovery
- Ontologies
- Automatic Summarization

Other Research Themes

- Legal Tutoring Systems (for Law students)
- Online Alternative Dispute Resolution (ODR)
- Machine Learning & Analytics
- Argument Mining
- Computational Law, Transactional Law

AI & Law in the 2010's

As represented by ICAIL (2011, 2013, 2015, 2017)



AI & Law in the 2010's

As represented by ICAIL (2011, 2013, 2015, 2017)

Dominant Research Themes

- Machine Learning
- Information Retrieval (Legal Search)
 - E-Discovery & Sense-making
 - Question Answering
- Extraction, Legal Knowledge Acquisition
- Evaluation

Other Research Themes

- Expert Assistant
- Online Alternative Dispute Resolution (ODR)
- Decision Support Systems
- Bayesian Networks for Reasoning

AI & Law: Beyond Foundations

What's been the impact of the community on the field?

Via IAAIL.org sponsored

- Conferences
- Workshops
- Proceedings
- Journal



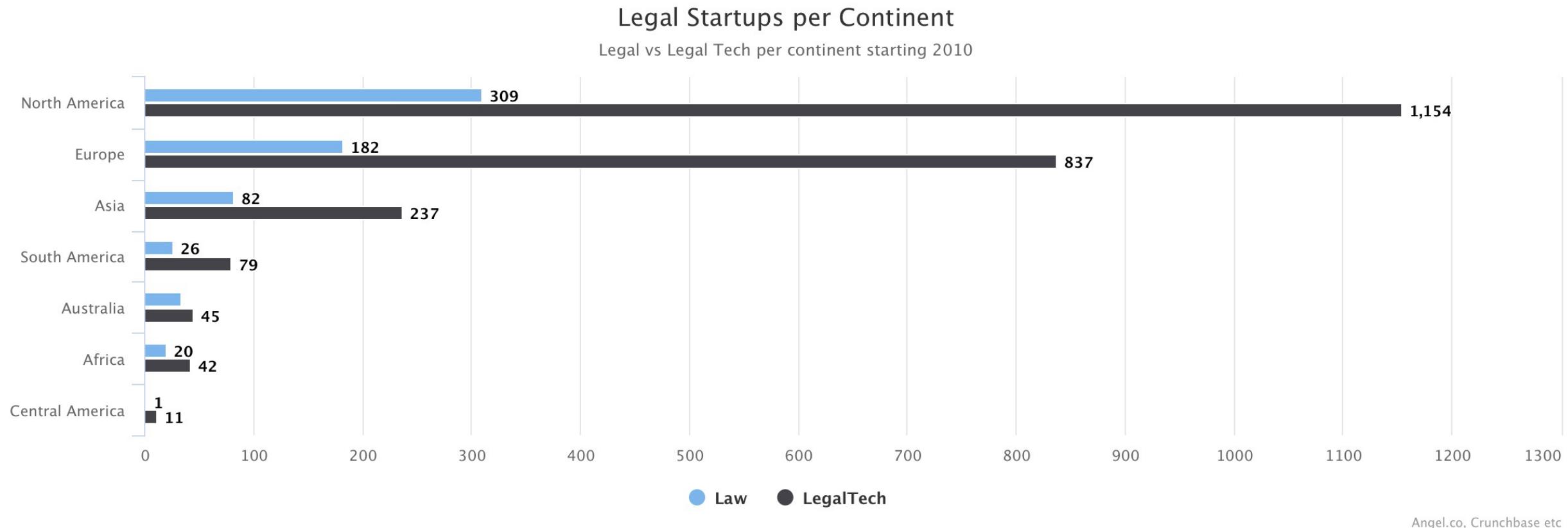
Answer: *Mixed*

- ICAIL and its workshops have showcased commercial successes, start-ups, luminaries
 - E.g., WIN (first NL vers. of Westlaw), Lex Machina (Stanford start-up now part of Lexis Nexis), seminal E-Discovery works in series of 7 'DESI' workshops
- But a large amount of activity in the AI - Legal domain in pockets outside IAAIL
 - E.g., CodeX (Stanford's Center for Legal Informatics) and especially in the startup space

The Role of Legal Start-ups

Legal Startups

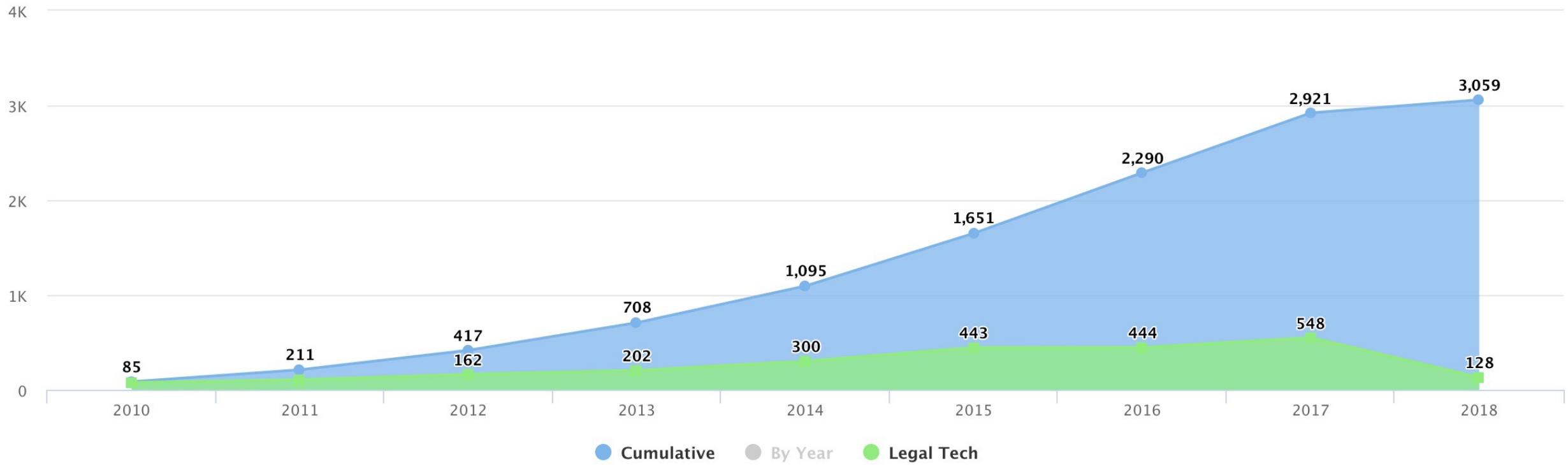
By Continent



Legal Startups

By Year

Legal Startups Total by Year

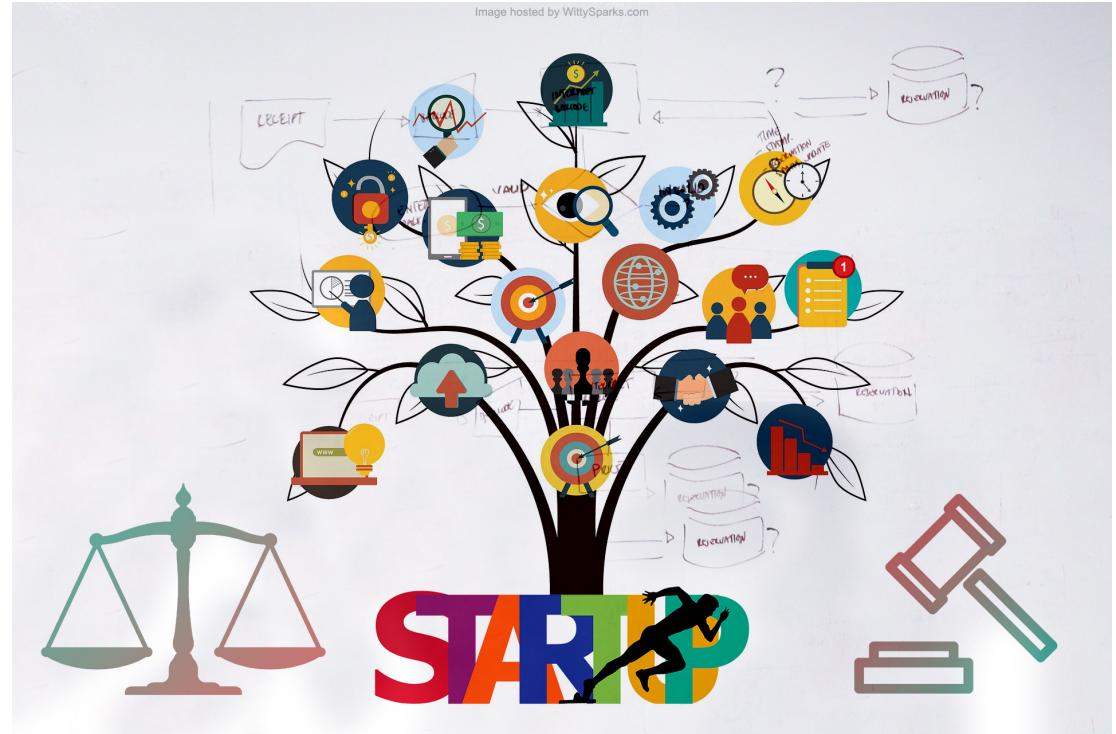


Angel.co, Crunchbase etc

Legal Startups – The Rest of the Story

<https://www.legalcomplex.com/blog/2015/12/29/legal-startups-charts/>

- Fill gaps in on-going research
- Tend to be highly focused
 - Address specific practitioner needs / problems
 - E.g., distribution of motions in the treatment of a course of litigation
- Often begin with a single jurisdiction or a specific legal practice area
 - E.g., California or IP
- Base next steps on past performance
 - Tied to likelihood of obtaining added funding
 - Trade-offs between expanded coverage and accuracy / value of results



From Past to Present

Foundations

- Grand visions (like AI as a whole)
- Much focus on
 - Legal knowledge representation
 - Formal & computational models of reasoning, based largely on inference and argumentation
 - Emphasis also on legal interpretation, decision making
 - Some models developed with domain experts
- Early systems rule-based, e.g., ‘TaxMan’
- Applications often focused on narrow sub-domains, e.g., trademark infringement

Today and into the Future

- Increasingly data-driven
 - Harness large & ever-growing data repositories
- Approaches to legal analysis has changed
 - It's now more empirical, corpora-based
- Underlying models statistical in nature
 - Semantic, citation-based, or temporal patterns
 - Data-centric techniques enable new algorithmic approaches to legal problem solving
- Analysis continues to leverage core NLP, data mining, and machine learning
 - Deep Learning / Neural Networks making increasingly significant progress

Current and Future Trends

Recent Trends Impacting AI & Law

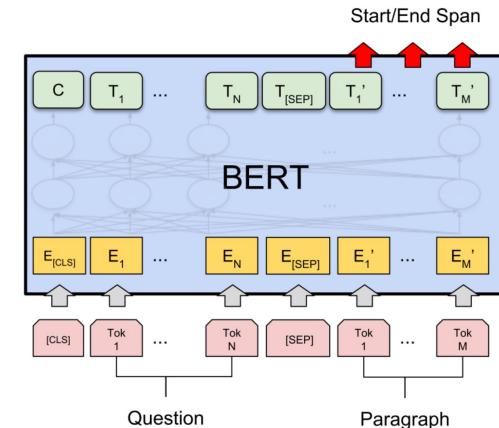
Growing presence of Deep Learning and Neural Approaches

BERT Devlin et al.

- Bidirectional Encoder Representation from Transformers
- New language representation model
- Designed to pre-train deep bidirectional representations from unlabeled text by jointly conditioning on both left and right layers
- Can be fine-tuned with a single added output layer
- Creates a SOA model for a wide range of tasks, QA, MT, Class., Summ.

DistilBERT Sanh et al.

- Operating large pre-trained models for essential NLP tasks can be challenging due to their size
- Proposes training smaller general-purpose language representation model
- Can then be fine-turned for a wide-range of tasks
- 40% reduction in BERT model size was reported to retain 97% of language understanding capability while being 60% faster



RoBERTa Liu et al.

- Robustly optimized BERT pre-training approach
- Replicated BERT study
- Determined BERT was significantly under-trained
- Carefully measured impact of many key hyperparameters and training data size
- Showed how hyperparameter choices have a major impact on final results
- Best model achieved SOA results versus standard collections, e.g., GLUE, RACE, SQuAD

Recent Trends Impacting AI & Law

Growing presence of Deep Learning and Neural Approaches

Legal BERT

Chalkidis et al.

- Examine different deployments of BERT for downstream Legal tasks while evaluating the model against different data sets
- Observe that general guidelines for pre-training and fine-tuning are not always suitable for such legal applications
- Propose a systematic study of BERT applications using three variants
 - a) Use original out-of-the-box BERT
 - b) Adapt BERT by adding additional pre-training on domain-specific corpora
 - c) Pre-train BERT from scratch on domain-specific corpora
- Also propose broader hyper-parameter search space when fine-tuning for downstream tasks
- Release a set of Legal BERT models to assist legal NLP research, computational law, and legal tech applications

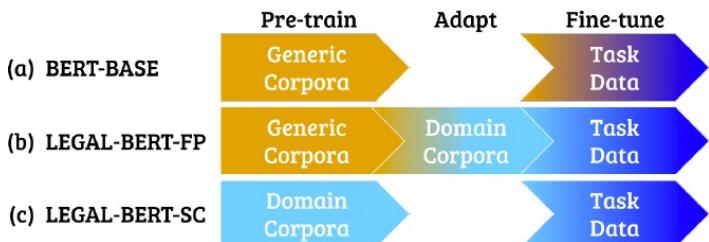


Table 2: Dataset overview

Dataset	Source	Task Type	Size
Overruling	Casetext	Binary classification	2,400
Terms of Service	Lippi et al. [26]	Binary classification	9,414
CaseHOLD	Authors	Multiple choice QA	53,137

Optimizing the Role of Training

Zheng et al.

- Observe that it remains unclear when researchers should rely on domain-specific resource-intensive pre-training
- Legal applications have shown few examples of substantive gains when domain pre-training has been used
- Hypothesize that current results come from legal tasks that are too easy, fail to meet conditions when legal pre-training can help
- Present a new dataset [CaseHOLD (Table 2)] consisting of 53K+ multiple choice questions to identify the relevant holding in a case
- Claimed to be a representative and difficult challenge
- Subsequently measure performance NLP tasks gains on CaseHOLD and other datasets
- Show that legal domain pre-training with custom vocab. outperforms BERT pre-trained on a general corpus
- Show domain pre-training may be warranted when task is similar to the pre-training corpus

Explainable Artificial Intelligence (XAI)

Role for Machine Learning

- Increasing concerns today about the **explainability** of technical approaches
 - Some conferences / workshops won't accept research reports that rely on "black box" technologies, where factors in the outcomes can't be explained or are not **transparent**
- Ability to tweak a system in a consistent and principled manner important
 - If **error analysis** can't be translated directly into **remedies and performance improvement**, how useful is the technology?
- **Ethical concerns** exist concerning inscrutable machine learning techniques
 - If we don't know what factors the machine is basing decisions on, how do we know it is unbiased, fair, and non-discriminatory?
 - The "social right to explanation" becoming increasingly expected
- Ultimately, systems that make life-saving or life-threatening decisions should be **interpretable**
 - E.g., self-driving cars



AI & Law: A Brief History

Key Research & Milestones

Thank you.

Jack G. Conrad
TR Labs -- Applied Research
Int'l Conference on Data Science & Management of Data
CODS-COMAD '23
Wednesday, 4 January 2023

See <http://www.tr.com/ai-jobs> for more information on
TR Labs openings in Bangalore