

# Artificial Intelligence and the Law

## IJCAI-ECAI 2018 Tutorial

Adam Wyner  
Swansea University  
School of Law and Department of Computer Science

### Goal

While the research subfield of Artificial Intelligence and Law has existed for some 30 years, only very recently has interest dramatically intensified and expanded owing to fundamental transformations in the legal services market, governmental agendas, data availability, and training in the law. The tutorial is a brisk tour and overview of the ways that familiar (and some novel) AI techniques and tools are being applied to legal materials (as opposed to the law applied to technology) as well as a sense of the possibilities for AI and Law to deeply impact society.

### Short Description

The research subfield of Artificial Intelligence and Law has existed for some 30 years. Yet, uptake in government, the legal industry, and legal professionals has been slow, which in turn has hindered research. However, recently, interest and activity has dramatically intensified and expanded owing to fundamental transformations in the legal services market, the open availability of legal data, and technologies to facilitate exploitation of the law, e.g. XML. An additional impact has been on training in law schools, where there is a new emphasis on learning to work with computational tools. Signaling the changes are numerous LegalTech startups, popular LegalTech meetings and groups, as well as new research and training centres in the US and Europe. Thus, there are new contexts, users, and materials for AI researchers to work on. While robo-lawyers are not in our immediate future (and there are some reasons to discourage fully automated legal reasoning in certain domains), AI interactive support for legal decision support is already in the pipelines.

The tutorial is a brisk tour of the ways that AI techniques and tools have been applied to or are challenged by legal materials. It highlights the ways that AI and Law can deeply impact society. The tutorial leaves aside important issues of the law applied to technology, e.g. privacy rights in online transactions. The presentation is intended to stimulate students and researchers to have a look into AI and Law research and development, getting in at early stages.

### Bio

Associate Professor of Law and Computer Science at Swansea University, United Kingdom. He works on knowledge extraction, representation, and reasoning to manage, analyse, and interpret volumes of textual data in Law (legislation, regulations, and case law), political science (policy-making), and the humanities (Linguistics and History). The research impacts on real world problems where decision support is essential, e.g. legal or political arguments. He has teaching and supervisory experience across the fields of Linguistics, Computer Science, and Law. He has published 12 journal articles, 38 conference papers, over 30 workshop papers on topics in artificial intelligence, linguistics, law informatics, abstract argumentation, and argument mining. He has participated in several larger AI and Law projects, including IMPACT, ESTRELLA, and LACR. He has been a (Co-)organiser of 14 workshops and seminars on Natural Language Processing as applied to legal texts and to argumentation.

## A detailed plan

- Introducing AI and Law in Legal Practice
  - Objectives of the tutorial - overview of AI applied to the Law
  - Outcomes of the tutorial - sense of the AI and Law landscape, where AI students and researchers 'fit in', promise of developments, and references
  - Traditional legal practice
  - Changes to legal practice
  - Future of legal practice
- (Very) Brief Overview of Relevant AI Techniques
  - Information retrieval
  - Text analysis and NLP
  - Machine learning
  - Logic
  - Ontologies
  - Semantic web/Knowledge Graph
  - Network analysis
  - Case-based reasoning
  - Not addressed: robotics, Law applied to AI, sensing, planning
- Statutory Reasoning
  - Structure of the law - statutes and regulations
  - Issues and tasks in modeling statutes: rules modeling; complexity of structure; compliance; complexity of interpretation
  - Techniques
    - \* Network analysis
    - \* Text analysis: rule-based and machine learning
    - \* Logic
  - Use cases and examples: business process integration and compliance management; exploring the statutory network; extracting textual information; reasoning with legal rules
  - Outstanding problems
- Legal Argumentation
  - What is argumentation? Abstract, instantiated, schemes, and textual
  - Models of argumentation for decision-support
  - Legal argumentation: defeasibility and inconsistency; change; references and links; standards of proof; values; evidence
  - Techniques
    - \* Graphing argumentation
    - \* Text analysis: rule-based and machine learning
    - \* Logic
  - Use cases and examples: collaborative rule-making; argument support in court
  - Outstanding problems
- Case-based Legal Reasoning
  - What is case-based reasoning?
  - What is a legal case?

- Models and methods of case-based reasoning: rule-based and machine learning
- Techniques
  - \* Text analysis: rule-based and machine learning
  - \* Argumentation
  - \* Ontologies and the semantic web
- Use cases and examples: predictions; reasoning with hypotheticals; court argument support
- Outstanding problems
- Contracts
  - What is a legal contract?
  - Issues and tasks in modeling contracts: patterns; rules modeling; construction; compliance; execution and distributed ledgers
  - Techniques
    - \* Abstract modeling
    - \* Text analysis: rule-based and machine learning
    - \* Contract construction
    - \* Integration of distributed ledgers
  - Use cases and examples: contract negotiation and agreement; execution tracking; dispute resolution
  - Outstanding problems
- Legal Ontologies, the Semantic Web, and XML
  - Samples of legal ontologies
  - How are legal ontologies developed? OASIS LegalXML
  - Use cases and examples: legislation online; sample legal ontologies
  - Outstanding problems
- The bigger picture: eParticipation, eDemocracy, eGovernment

## Background literature and citations

- Kevin Ashley. 2017. Artificial Intelligence and Legal Analytics: New Tools for Law Practice in the Digital Age. Cambridge University Press.  
Link: [Artificial Intelligence and Legal Analytics](#)  
*This is a recent, (almost) comprehensive book length publication.*
- G. Sartor, M. Palmirani, E. Francesconi, and M.A. Biasiotti (Eds.) 2011. Legislative XML for the Semantic Web: Principles, Models, Standards for Document Management. Springer.  
Link: [Legislative XML for the Semantic Web](#)  
*This is a book length summary of tutorials given at the summer school.*