RESEARCH PROGRESS IN ARTIFICIAL INTELLIGENCE AND LAW: AN INTELLECTUAL SURVEY

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The course will comprise four three-hour seminar sessions.

Session 1. Introduction to AI & Law and its Role in Future Legal Practice. Computational Models of Case-based Legal Reasoning.

Provides an introduction to Artificial Intelligence and Law and discusses its role in future legal practice given recent develops in information extraction from natural language texts. The ramifications of developments in IBM's Watson and Debater programs will be discussed. Also presents some classic computational models of case-based legal reasoning and contrasts common law with civil law legal reasoning. Different approaches are discussed for taking values into account in modelling reasoning with legal cases.

Session 2. Computational Models for Predicting Legal Outcomes and of Legal Argument. Bridging Computational Models and Legal Texts

Discusses recent approaches to predicting the outcomes of legal cases and how recent advances in argumentation theory, argument schema and critical questions, and diagrammatic argument representations, impact ways in which researchers computationally model legal argument, and design, implement, and evaluate legal expert systems. The prospects and techniques for enabling computational models of legal reasoning to work directly and automatically with legal texts will also be discussed. We consider how automatically extracting argument-related information from case texts can improve legal information retrieval.

Session 3. Representing and Extracting Argument-Related Information in Legal Case Texts.

The session introduces a specialized kind of ontology, a "type system." Type systems help to organize and integrate text annotators, cooperating software programs capable of analyzing text,

identifying different kinds of concepts and relations (i.e., "types") in regions of text, and assigning types to texts (i.e., "annotating") them. Legal ontologies and type systems are aimed at promoting precision in communication and facilitating integration and interoperability of knowledge sources. The system of types formalizes the annotators' analysis inputs and output data and helps to coordinate the annotators' communications.

New techniques can extract argument-related information from legal case texts. The information extracted includes argument-related roles of sentences (e.g., as propositions in arguments, premises or conclusions, statements of rules in the abstract or as applied to specific facts, or case holdings and findings of fact) and legal factors (i.e., stereotypical fact patterns that strengthen a claim)). This session describes an architecture for applying a UIMA type system and text annotation pipeline to process legal case texts for argument-related information. It continues the discussion of LUIMA (Legal Unstructured Information Management Architecture), the law-specific semantic extraction toolbox based on the UIMA framework and designed to automate the conceptual mark-up of legal documents. The session addresses the task of manual annotation of legal texts, necessary in order to create training sets of documents for machine learning classification. Ostensibly a task for human annotators with some level of domain expertise, clever decomposition of the annotation tasks makes possible crowd-sourced solutions for annotation.

Session 4. Conceptual Legal Information Retrieval for Cognitive Computing, Cognitive Computing Legal Apps, The Future of AI and Law: Bridging Computational Models and Legal Texts.
A prototype architecture, described in this session, takes techniques for automating conceptual mark-up of documents and for extracting information from legal case texts and integrates them into a system for conceptual legal information retrieval. The prototype system comprises modules for automatic sub-sentence level annotation, machine-learning-based sentence annotation, basic retrieval using a full-text information retrieval system, and a machine-learning-based reranking of the retrieved documents. The session explains how to evaluate such a prototype system objectively and how to assess any contribution it makes to a commercial full-text legal information system. The session explores how to extend the prototype type system to enable a range of conceptual queries not possible with current legal information systems. It discusses techniques and some remaining challenges for annotating documents in terms of the extended system of types.

The session concludes the seminar by introducing students to new legal apps and demonstrating how the above techniques for extracting semantic legal information and using to for cognitive computing will enable humans to use computers to formulate and test legal hypotheses and corpora of legal case texts.

Introduction to AI & Law: Researchers in AI & Law design computer programs that model legal reasoning tasks and assist legal practitioners in solving legal problems. The researchers construct computational models of legal reasoning (CMLRs) that address such questions as how to represent what a legal rule means so that a computer program can decide whether it applies to a situation, how to distinguish "hard" from "easy" legal issues, and what roles cases and values play in interpreting legal rules. Their answers to these questions, however, are not philosophical but scientific; their computer programs not only model legal reasoning tasks but actually perform them, and the researchers conduct experiments to evaluate how well their programs perform. Recent developments in information extraction from text for computerized question-answering and argument generation promise to enable researchers to connect their CMLRs directly to legal texts, that is, to the cases, statutes, regulations, contracts, and other texts that legal professionals actually use, and to apply their programs in real-world legal information retrieval, prediction and decision-making.

Course Materials: Readings will be distributed electronically via a TWEN course website at lawschool.westlaw.com. In order to access the site, students will need to use a Westlaw password and a course password, which the instructor will distribute via email.

Course requirement: In order to stimulate classroom discussion and foster understanding of the readings, for each session, each student should prepare a one-page critique of each session's readings. These one-page critiques should be submitted electronically to the instructor in the morning before each seminar session. Each student should select some approach described in the day's readings that the student finds interesting and write:

     (a) a very brief description in the approach, and short descriptions of:
     (b) the strengths of the approach,
     (c) the weaknesses of the approach, and
     (d) the reasons why the student finds the approach of interest. The student should try to relate it to some specific legal project, paper, or educational experience in which the student has been involved.

Please send an email to monica.palmirani@unibo.it to facilitate organizing the lectures.

PROGRAMME

Session 1	**Introduction to AI & Law and its Role in Future Legal Practice. Computational Models of Case-based Legal Reasoning.** **Readings* to be discussed:** • Chapter 1: Introducing AI & Law and its Role in Future Legal Practice • Chapter 3: Design Tools and Constraints for Case-Based Legal Reasoning
Session 2	**Computational Models for Predicting Legal Outcomes and for Legal Argument. Bridging Computational Models and Legal Texts** **Readings to be discussed:** • Chapter 4: Design Tools and Constraints for Predicting Legal Outcomes • Chapter 5: Computational Models of Legal Argument and Legal Argument Schemes
Session 3	**Representing and Extracting Argument-Related Information in Legal Case Texts.** **Readings to be discussed:** • Chapter 6: Representing Legal Concepts in Ontologies and Type Systems • Chapter 10: Extracting Argument-Related Information from Legal Case Texts
Session 4	**Conceptual Legal Information Retrieval for Cognitive Computing. Cognitive Computing Legal Apps. The Future of AI and Law: Bridging Computational Models and Legal Texts** **Readings to be discussed:** • Chapter 11: Conceptual Legal Information Retrieval for Cognitive Computing • Chapter 12: Cognitive Computing Legal Apps

* All readings are from *Artificial Intelligence and Legal Analytics: New Tools for Law Practice in the Digital Age*, a new book by Kevin D. Ashley, to be published in 2017 by Cambridge University Press. Readings will be distributed electronically. This material is an uncorrected excerpt from the book. It is for personal use only. Do not copy or distribute.