A Logical Approach to Third Party Dispute Resolution Prediction

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Two ways to represent court decisions in AI

I. Descriptive (case based)
   - The easy way: a set of explicit data extracted from the text of the decisions;
   - Predictions are based on quantitative pattern recognition.

II. Prescriptive (rule based)
   - The hard way: a set of explicit data and their implicit logical antecedents (specific and general);
   - Predictions are based on the specific antecedents and general decision principles and policies (meta-norms that relate and rank opinions and decisions).

The easy way introduces:

1. A validity problem
   - Humans can recognize patterns, but eventually they legitimize their conclusions by arguments based on the use of specific antecedents for specific conclusions and general principles and policies to make a choice between legitimate alternatives. The patterns only predict 70% of the (easy) cases;
2. An ethical problem
   - If you only use explicit data, you miss the chance to improve future decisions. Learning in the legal domain is based on the evaluation of alternatives;

The data set should therefore explicate these arguments.

A logic that can accommodate this combination of explicit and implicit data can predict (not only the 70% (easy) cases but also the 30% (hard) cases) and improve decision making.

Research questions (answered)

- Can we reconstruct reasonable legal positions in a perspective bound world of dynamic and conflicting individual and public interests, and their associated norms and legal positions?
  - Legal positions differ from location to location, from alliance to alliance, change in time and often depend on individual perspectives;
  - These legal positions can not be discarded since they are part of the argument that decides the case;
  - They can even recur in future decisions and court decisions can be reviewed and even reversed;
- How can we define the logical relation between these dynamic positions and court decisions?
- How can we implement this logical relation in an algorithm?
- How can we validate the algorithm (and with that the logic) against practical data?
- Can we make an assessment of the complexity of cases in order to be able to improve decision making?

Developed Models and Algorithms, Validation

- Logic of reasonable inferences (models dynamic and inconsistent legal knowledge), and
- A Model of complexity for the legal domain (models the difference in opinions involved in a legal dispute);
- Implemented as Argumentator (algorithmic model of the LRI and the Model of complexity: a legal knowledge system shell);
- The machine was tested against a dataset of 430 cases (first instance, third party decisions about environmental permits);
- 425 of the 430 cases were correctly reconstructed (predicted on the basis of the explicit data and general antecedents);
- The machine was tested against 45 complex cases of which 66% (30) were improved by the machine on the basis of elicited general antecedents, principles and policies;
- So Argumentator (the machine) is a valid model of legal decision making and legal complexity.

Conclusions

- About data sets
  - A description of inputs (data and norms mentioned) and outputs (opinions mentioned) do not suffice;
  - Implicit arguments should be explicated (i.e. specific norms relating data and opinions and general (decision) norms relating conflicting opinions);
- About predictions
  - Valid predictions include implicit arguments;
  - These arguments can be elicited by providing judges with a decision support system that demands explication;
- About ethics
  - Descriptive (numerical) approaches reduce the quality of predictions and are not transparent (no semantics);
  - Prescriptive (qualitative) approaches include a comprehensive data set and a prediction algorithm that improves the quality of dispute resolution;
  - These should be available to the public to further transparency and to prevent unnecessary disputes.

Questions