A Dialogical Framework for Disputed Issues in Legal Interpretation

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Abstract. We present a dialogical framework modelling the exchange of arguments concerning legal interpretation. The framework may be used to model legal debates on interpretation of statutes or contracts with the use of structured argumentation. We introduce the notion of abduction move that generates the set of sentences (and arguments based thereon) that would justify the choice of a given deliberated conclusion.

Keywords. Argumentation, Interpretation, Justification, Hybrid systems

1. Introduction

Major part of legal disputes has essentially dialogical setting of certain type: trials involve exchange of please between parties to the litigation, negotiations consist in posing options and commitments of the parties, members of legal doctrine comment on judicial decisions and publications of other scholars. Each type of legal discourse may be accounted for a dialogue consisting in presenting arguments for and against a given thesis, also if this dialogue is only “virtual” in the sense it involves only one physical agent. Therefore it is not surprising that the dialogical features of legal reasoning have been modelled in the field of AI and Law since the early days, to mention three-ply argument in HYPO [2], the model of Pleadings Game [5] or the model for assessing conflicting arguments developed by Prakken and Sartor [7]. The present contribution offers a first dialogical framework to model debates on legal interpretation of relevant sources (statutes or contracts). The focus of the model is on the transparency of argumentation moves and on the explainability of the solution, encompassed by the specific abduction move that leads to the generation of potential elements of reasoning which would support a decision in favour of each of the deliberated conclusions.

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2. The Model of Agents Arguing on Interpretation

The model outlined below represents the process of argumentation of relevant agents involved in a dispute on the meaning of contractual provisions. As a point of departure, we adopt the notion of Interpreting Agent as defined in [3], developed, amended and partially restricted for the sake of realization of the purposes of this paper. We do not define any specific logical language or argumentation system for this model, because it may in principle be implemented in different existing well-developed formal systems such as Carneades [5] and ASPIC+ [6] in environments that enable artificial agents interaction, for instance via dialogue protocols [1]. The presented model may be used for testing of expressive power of the abovementioned formal systems.

Definition 1. Interpreting Agent. Each Interpreting Agent (IA) is a tuple $<KB(IA)_t$, $state(IA)_t$, $authority(IA)_{t, C,}$ $mode(IA)_c$ >, where:

- $KB(IA)_t$ is the knowledge base of the Agent at the time t,
- $preferences(IA)_t$ is the set of the Agent's preferences and goals at the time t,
- $authority(IA)_{t, c}$ - Authority – is the characterization of the formal status of statements used by an agent, at the time t and in the context of the case c. The typical agent vested with non-empty authority(IA)t, c is the Judge [4].

By IA we denote the set of all agents.

Definition 2. Argument. Let L be a defined language being able to express terms and let S_L be the set of all sentences of the language L. Then for any Γ, Ω ⊆ S_L an ordered pair < Γ, Ω> is an argument if and only if:

- PRO < Γ, Ω> - the set of sentences A provides reason for the acceptance of the set of sentences Ω, or
- CON < Γ, Ω> - the set of sentences A provides reason for the rejection of the set of sentences Ω.

We will use the symbol ARG as a variable that may adopt the values PRO or CON. For the structures of interpretive arguments see [8].

Definition 3. Authorship Relation. The relation of authorship is a subset of a Cartesian product: R ⊆ IA × ARG , i.e. a set of pairs: (ia, A), where ia ∈ IA and
A ∈ ARG.
By ARG_{ia} we denote the set of all arguments created by agent ia. If A ∈ ARG_{ia} t and A= < Γ, Ω> then by conc(A) we denote the conclusion of argument A (Ω).

Definition 4. Interpretive Statements. Let *s* and *t* be terms of the language L. An Interpretive Statement is a sentence in L expressing a relation "is interpreted as" between a pair of terms of L: s • t [3].

Definition 5. Incompatibility. Let α and β be the statements of the language L. The two statements are incompatible INC (α , β) if they cannot be accepted together by an agent IA taking into account the structure of the agent. Hence, the notion of incompatibility is agent-relative.

Definition 6. Argument ordering. The expression in L $\mathbf{ARG_i} > \mathbf{ARG_j}$ means that the set of arguments ARG_i is stronger than the set of arguments ARG_j. In practical argumentation the compared sets of arguments will most often be singletons. The argument ordering relations may follow from the Knowledge Base of IAs by default or they may be subject of dispute between the agents.

As an argumentation process we understand the dynamic process of argument invention, exchange, justification, and attack.

In particular, the framework should be capable enough to represent the argumentation moves.

Definition 7. Argumentation Moves. Each IA is entitled to perform the following argumentation moves:

- assertion(α) – asserting a statement α
- questioning(α) – demanding an agent A who asserted α to provide justification for α
- providing support for α - asserting such β that PRO $<\beta, \alpha>$
- undermining attack on the argument ARG $<\alpha, \beta>$ – asserting such γ that CON $< \gamma, \alpha >$
- rebutting attack on the argument ARG $<\alpha, \beta>$ – asserting such γ that CON $< \gamma, \beta >$ or such γ that PRO $< \gamma, \delta >$ where INC (δ , β).
- undercutting attack on the argument ARG $<\alpha, \beta>$ - asserting such γ that CON $< \gamma$, ARG $<\alpha, \beta> >$
- retract(M) – retraction of a previously made move M.
- abduction(D, KB) – generation of a set of sentences D from the set KB(IA_t) and arguments based on them that would lead to assignment of priority to one of the competing conclusions, were these sentences asserted by a given agent.

The idea of the abduction move is the generation of different sets of sentences could provide justification for the final conclusion. The abduction move may then motivate the user of the system to look for additional evidence or suggest the direction of argumentation with regard to legal matters. If a given agent is not sure what move should be made in order to obtain the justification status of a given conclusion, the abduction move shall indicate the possible solution.

Definition 8. Justified formula.

A formula α is:

- weakly justified iff there is at least one sound argument PRO $<\Gamma, \alpha>$
- strongly justified iff there is at least one sound argument PRO $<\Gamma, \alpha>$ and PRO $<\Gamma, \alpha>$ is stronger than any argument CON $<\Omega, \alpha>$ or any argument PRO $<\Omega, \beta>$ such that INC (α, β).
- undoubtedly justified iff there is at least one argument PRO $<\Gamma, \alpha>$ and there is no arguments CON $<\Omega, \alpha>$

More fine-grained notions of justification may be defined, cf. standards of proof in [6].

Definition 9. Sound argument.

An argument A that is not attacked is sound.

An argument A is sound if the arguments constructed to undermine or undercut A are unsound.

An argument is unsound if it is undermined or undercut by a sound argument.

The abduction move may be constrained in different manners, such that the number of other moves necessary to obtain weak or strong justification for a given conclusion.

3. Conclusions

We outlined a model of intelligent agents based on argumentation and explicit knowledge stored in the agent's knowledge base. The model itself has abstract character, but it may be fruitfully applied to the interpretation of statutes and contracts. Such model should be capable of enabling agents involve in a dialogue concerning interpretation of statutory or contractual provisions and suggesting them possible solutions to the interpretive problems by means of abduction. Such systems, being able to explain the reason for the suggested solutions should complement the developed ML systems based on statistical methods.

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