Argumentation Based Tools for Policy-Making

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1. INTRODUCTION

Citizens have a variety of ways to consult with their representatives about policy proposals, seeking justifications, objecting to all or part of it, or making a counter-proposal. For the first, the representative needs only to state a justification. For the second, the representative would want to understand the objections, which may involve asking some questions. For the third, the citizen would have to provide a well formulated proposal that can then be critiqued from the standpoint of the government's own policy proposal. At the end of such a consultation, users will have aired their proposals, understood the implications, and received feedback on how their proposals contrast to that of the government.

With current web technologies, citizens increasingly desire to participate in policy-making, and governments are able to provide opportunities for them to do so. However, many issues arise when one considers how to analyse, evaluate and respond to the volume of data gathered. For developers, it is key to design and build tools that balance between ease of use by the general public and use of an underlying structure to organise the content so that the public's responses can be meaningfully analysed. One way to accomplish both goals is to represent the content with a computational model of argument, particularly, argumentation schemes. The demonstration provides interactive programs for the second and third approaches to consultations, similar to those described in [2, 5]; for the second we provide a *Structured Consultation* tool (SCT), while for the third a *Critique* tool (CT).

2. GENERAL APPROACH

Both tools are ways of using and presenting, for the purposes of policy consultations, a well-defined domain using a formalisation of an argumentation scheme [3] that is grounded in a semantic model [1], providing a systematic way to structure, investigate, and critique the policy proposal. The tools are web-based applications written in PhP; they access the same MySQL database, though with different queries, indicating a useful domain representation.

Argumentation schemes are taken as *presumptive*, *defeasible* patterns of reasoning [4]. Given that argumentation schemes are defeasible, we may consider the various ways to critique them. The main scheme under examination is the *Practical Reasoning* scheme (PR), since policy-making proposals are often cast as claims about what should be done. In addition, the SCT makes use of auxiliary argumentation schemes to justify elements of the PR scheme. To provide the formal structure, the scheme is analysed in terms of a semantic model of the Action-based Alternating Transition System (AATS) with values as described in [3], implemented as a database. The AATS components that are represented include: literals, states (sets of literals that hold of a state), actions (that relate to transitions between states), transitions (functions from states to states), agents (parties that carry out actions), and values (that are promoted or demoted by the actions of agents).

> **PR**: In the current circumstances (R), action ac should be performed by agent ag, since this will bring about a new set of circumstances (S). By the ag executing ac in R to bring about S, a social value (v) is promoted (demoted or not affected).

The scheme, when instantiated, is an argument for the conclusion about the action that should be performed. The scheme is associated with ways to critique it, given as critical questions, indicating ways some other argument could attack it. In the implementations, the critiques either guide the structure of presentation (for SCT) or provide feedback to the user (for the CT). Among the critiques from [3], we have:

1. Is the action possible?
2. Can the action have the stated effects?
3. Does the action promote the value?
4. Are there negative side effects?
5. Are there other ways to promote the value?
6. Could other values be promoted?
7. Do the other agents do what they are supposed to do?

Some of these simply challenge the truth of a premise or rebut the conclusion, but others may establish that the circumstances are such that the scheme cannot be used. With regard to this particular scheme, the existence of better actions is a particular source of challenge: while the argument may provide a justification, and so be a good argument, it can be defeated by an argument for a better action. The subsidiary schemes of the SCT relate to particular challenges;

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the *Credible Source* scheme (CS) examines the justification for circumstances or consequences of the action, such as the expertise attributed to a statement. Two other schemes, Value Credible Source scheme (VCS) or the Value Recognition (VR) scheme, justify the values in different ways.

3. STRUCTURED CONSULTATION TOOL

The SCT is designed for the second sort of consultation, where the policy-maker presents a policy to citizens as a survey and solicits their opinion on the particulars of the policy. We briefly describe the flow of the SCT. The user is presented with five screens, one each for an introduction, circumstances, consequences, values, and a summary page. Each screen is intended to be self-explanatory. On the first screen, the user is presented with the question that is being addressed, the particular policy proposal being considered, and information about how to use the tool and the purpose of the tool. Passing to the next screen, the user engages with the consultation, which has a *main* line and *digressions*. The main line of the consultation is structured around the components of the PR scheme, e.g. circumstances, consequences, and values; these elements are presented with defaults (e.g. *agree* or *demote*) that represent the position of the policy-making body. Should the user select something other than the default, digression screens open, wherein the user can investigate further the justification for the defaults, then return to the main line. Digressions are structured around the constituents of the relevant subsidiary argumentation schemes justifying the statement disagreed with. Each proposition in the circumstances and consequences has a digression with respect to the CS; each of the values has a digression with respect to either the VCS or the VR. On each of these subsidiary screens, further defaults are presented (in effect the policy-maker's justification for the main line statement), allowing the user to indicate what she does not accept (thereby justifying why she did not accept the main line statement). In this way, the user gives a fine-grained, structured opinion about the circumstances, consequences, and values along with her justifications for these opinions.

4. CRITIQUE TOOL

The CT turns the consultation around. Rather than the policy-maker presenting a policy for the citizen's reaction, she is able to *interactively create* her own policy proposal by selecting from a menu of choices, which is then critiqued from the standpoint of the government's policy proposal.

From the database representation of the semantic model, the program generates the logical space of justifications of actions, and forms menus to solicit the user's beliefs as to the current state, a proposed action, the state the user believes will be reached as a consequence of the action, and the value the action will promote. For each part of the user's proposal, the program applies the tests defined in [3], and where appropriate, offers the corresponding criticism or *caveat*. After an introductory page, the user is presented with the series of screens which allow her to select the propositions that hold of the current situation, what actions should be executed, what the consequences would be, and what social values are promoted (demoted, unaffected) by the action's execution from the current situation. At each point, the user is free to choose from a menu of alternatives, which are checked against the policy-maker's proposal. However, the policy-maker's proposal is only incrementally revealed to the user over the course of the interview. In this way, the user gets the opportunity to represent what she believes to be the case, what can be done, what the consequences are, and whether values are promoted (demoted, unaffected). In the demo, each element has a link to further information. On the first webpage of the demo, the user is presented with a selection of propositions and invited to select those that she believes to be true in the current situation. The selection is then automatically checked against what the policy-maker believes to be the case. If the policy-maker and user agree, then the tool reports agreement; otherwise, the tool reports that the policy-maker disagrees as well as what the policy-maker believes the situation to be. The user can either hold her position or change it, as she sees fit. On the next page, the user is asked what the policy-maker should do, given the circumstances as given by the user. If the action can be done given the circumstances (e.g. the preconditions for execution are satisfied), the tool states that the action is possible; otherwise, it reports that the action is not possible. The fourth screen allows the user to select amongst the consequences of the selected action; the tool reports whether or not (according to the data) the action does, indeed, result in the selected consequences. The user then progresses to a screen bearing on values promoted from the execution of the action. As before, the tool reports whether or not the policy-maker agrees with the user's choices, and where it disagrees, what obtains instead. On the final page, the user receives a range of additional feedback bearing on various critiques to the user's proposal such as side effects, other ways to promote values, and the possible other actions by agents along with their consequences. Thus, the user is given a thorough analysis of implications of her proposal.

5. CONCLUSION

The paper has outlined implementations of two policy-making support tools, based on a computational model of argumentation that uses argumentation schemes allied with semantic models. Both tools are open-source and online.[1]

6. REFERENCES

[1] K. Atkinson, T. Bench-Capon, D. Cartwright, and A. Wyner. Semantic models for policy deliberation. In *Proceedings of ICAIL 2011*, pages 81–90, Pittsburgh, PA, USA, 2011.

[2] K. Atkinson, T. Bench-Capon, and A. Wyner. Opinion gathering using a multi-agent systems approach to policy selection. In *Proceedings of AAMAS 2012*, pages 1171–1172, Valencia, Spain, June 2012.

[3] K. Atkinson and T. J. M. Bench-Capon. Practical reasoning as presumptive argumentation using action based alternating transition systems. *Artificial Intelligence*, 171(10-15):855–874, 2007.

[4] D. Walton, C. Reed, and F. Macagno. *Argumentation Schemes*. Cambridge University Press, 2008.

[5] A. Wyner, K. Atkinson, and T. Bench-Capon. Model based critique of policy proposals. In *Proceedings of ePart 2012*, pages 120–131, 2012.

[1]The SCT was developed as part of the IMPACT Project (FP7-ICT-2009-4). Code available upon request. Online tools:
SCT: `http://impact.uid.com:8080/impact/`
AT: `http://cgi.csc.liv.ac.uk/~maya/ACT/index.php`