Explaining preferences with argument positions

Knowledge representation, argumentation, practical reason, dialectics

Abstract

This work is an account to a generic framework for argumentation used for practical reasoning, in which values are associated to arguments and preferences between values are considered. We extend this framework by stating that the construction of an acceptable set of arguments should take into account different desirability levels of arguments, and that the value preferences must not be taken as an input of the construction, but instead should emerge and be explained by the construction.

1 Introduction

We are concerned with *practical reasoning* - reasoning about which action should be performed in a given situation. Such reasoning has features which any account must respect.

First, arguments justifying actions must be considered in the context of other related arguments: an argument can only be accepted if due consideration to arguments attacking and defending them is given. In a set of arguments relating to an issue - which we call a *debate* - the acceptability of an argument relies on it forming part of a coherent subset of such arguments able to defend themselves against the attacking arguments. We call such a coherent subset a *position*. The construction of a position and related problems of acceptability have been explored in AI through the use of argumentation frameworks, e.g. [Dung, 1995; Bench-Capon, 2003]. Such reasoning can be naturally explored through the use of a dialogue in which an argument is attacked and defended [Cayrol *et al.*, 2003; Dunne and Bench-Capon, 2003; Bench-Capon, 2002].

Second, debates about which action is best to perform must permit rational disagreement. Whereas the truth of facts may be demonstrated and compel rational acceptance, with regard to actions there is an element of choice: we cannot choose what is the case, but we can choose what we attempt to bring about, and different people may rationally make different choices. Such differences in values and interests mean that arguments will have different *audiences*, and what is acceptable to one audience may be unacceptable to another. Disagreements are represented in [Dung, 1995] by the presence of multiple acceptable positions. In [Bench-Capon, 2003], an extended argumentation framework which explicitly relates arguments to values and explicitly represents audiences in terms of their preferences over values has been advanced.

While a framework such as that of [Bench-Capon, 2003] can be used to explain disagreements between different audiences in terms of their different ranking of values, it does not explain how these value rankings are formed. A third feature of practical reasoning (as indicated in [Searle, 2001]) is that we cannot presuppose that people bring to a debate a knowledge of their value preferences. It means that the *value preferences should emerge from the construction of a position* instead of being taken as an input.

Finally, a practical reasoner may not equally consider arguments: he may have certain arguments that he wishes to include in his position (say, some *desired arguments*), certain arguments that he wishes to exclude (*rejected arguments*), and may be indifferent to the status of the remainder (the *optional arguments*). For example, a politician forming a political programme may recognise that raising taxation is electorally inexpedient and so must reject any arguments with the conclusion that taxes should be raised from the manifesto, while desiring that arguments justifying actions bringing about core objectives are present: other arguments are optional, and acceptable if they enable this. Such a distinction between arguments has been taken into account in the construction of positions for [Dung, 1995] framework by [Cayrol *et al.*, 2002], but not for [Bench-Capon, 2003] framework.

It is an account of these two last phenomenons in [Bench-Capon, 2003] framework which is the objective of our work.

2 Definition of a position

To take into account the fourth feature of practical reasoning, we define an extension of [Bench-Capon, 2003] framework, called **DOR-partitioned value-based argumentation framework** (DOR-VAF), as a tuple $\langle \mathcal{X}, \mathcal{A}, \mathcal{V}, \eta \rangle$, where: $\mathcal{X} = D \cup O \cup R$ for three disjoint sets D, O and R, which denote respectively a set of *desired arguments*, a set of *optional arguments* and a set of *rejected arguments*; $\mathcal{A} \subseteq \mathcal{X} \times \mathcal{X}$ is an *attack* relation between arguments; $\mathcal{V} = \{v_1, v_2, \ldots, v_k\}$ is a set of k *values*, and $\eta : \mathcal{X} \to \mathcal{V}$ is a mapping that associates a value $\eta(x) \in \mathcal{V}$ with each argument $x \in \mathcal{X}$.

As in [Bench-Capon, 2003], preferences between values are considered through the notion of an *audience*, which is a transitive relation $\vartheta \subset \mathcal{V} \times \mathcal{V}$ that does not allow a value to

be preferred to itself. A pair $\langle v_i, v_j \rangle$ is referred to as 'v_i is *preferred to* v_j' w.r.t. ϑ. Given an audience ϑ, an argument x *defeats* an argument y if x attacks y and the value of y is not preferred to the value of x w.r.t. ϑ; an argument x is a *defender* of an argument y if and only if there is a finite sequence $a_0, \ldots, a_{2n}$ such that $y = a_0$, $x = a_{2n}$, and $\forall i, 0 \leq i \leq (2n-1)$, a_{i+1} defeats a_i w.r.t. ϑ.

A **position in a DOR-VAF** is defined as a set of arguments $P = D \cup Y$ with $Y \subseteq O$, such that there exists at least one audience ϑ with respect to which: (i) no argument in P defeats w.r.t. ϑ another argument in P; (ii) any defeated argument in P w.r.t. ϑ has a defender w.r.t. ϑ in P; (iii) each optional argument of Y is a defender w.r.t. ϑ of a desired argument of D. An audience for which P is a position is said to be a *corresponding audience* of P.

This new notion of a position allows the third feature of practical reasoning to be taken into account: the preferences between values are not given as an input of the definition, but are a result of it.

3 Development of a position

In order to build a position in a DOR-VAF, one may start with considering the set of desired arguments. This set must be first tested to demonstrate that there is at least one audience w.r.t. which no desired argument defeats another desired argument. If this test succeeds, it may imply some preferences between values to be taken into account. Then we must ensure that any defeated argument of the set has a defender in the set w.r.t. at least one audience. To this end, some optional arguments may be added to the set as defenders of defeated arguments and/or some constraints on the ordering of values may be imposed. If the process succeeds, then the set developped is a position and the set of constraints determined by the construction can be extended into a corresponding audience of this position, by taking its transitive closure. Otherwise, the user has to re-consider the partition of the set of arguments.

This construction can be presented in the form of a dialogue between two players. One, the opponent, outlines why the set under development is not yet a position, by showing the defeated arguments of the set. The other, the proponent, tries to make the set under development a position by extending it with some optional arguments and/or some constraints between values. If the proponent terminates the dialogue, then the set of arguments he played is a position, and the set of contraints he also played can be extended into a corresponding audience. Otherwise, the set of desired arguments cannot be extended into a position.

This presentation on a dialogue form has the main advantage to make clear why some constraints between values must be taken into account, and why some optional arguments must belong to the position. Moreover, it captures well the first feature of practical reasoning. In [Doutre *et al.*, 2005], an original formal dialogue framework, extending previous dialogue frameworks for argumentation, is introduced and instanciated in order to capture the construction above. The instanciation takes into account some heuristics aiming at keeping the extensions of the set under development to a minimum.

4 Conclusion

We believe that this approach will have significant applications in the analysis and modelling of argumentation, for instance in areas such as case law and political debate, both of which are receiving increasing attention as the notion of e-democracy becomes widespread. On a more theoretical point of view, belief revision and data mining could also benefit from this approach. TO DEVELOP?

References

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