Weighted Bipolar Argumentation Frameworks as Models of Human Reasoning

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Abstract argumentation is a means of analysing how individual arguments interact with one another. It can be a useful tool for efficiently detecting conflicts within a set of statements or determining which arguments should be accepted. However, abstract argumentation is seldom studied from a cognitive psychology perspective. Whether or not algorithms that determine the acceptability of arguments map on to actual reasoning is not well understood. This research aims to investigate how well different models of argumentation correspond to how humans reason about arguments.

One representation of a set of abstract arguments is a Weighted Bipolar Argumentation Graph. Each argument has a weight (intrinsic strength), and may attack or support other arguments, creating a directed graph structure. A semantics (means of evaluation) can then be used to assign acceptability degrees to each argument. Different semantics algorithms exist which have different properties, such as DF-QuAD, Euler-based and quadratic-energy semantics.

The present research proposes an experimental method for evaluating the psychological validity of different semantics algorithms. The intrinsic strength of arguments can be approximated by participants' ratings of isolated general-form arguments. The acceptability degrees can then be approximated by participants' evaluation of sets of concrete arguments corresponding to specific graph structures. The approximate acceptability degrees can be compared to those resulting from different semantics algorithms to determine how well the algorithms match actual human reasoning.