

Uncertainty and fuzziness: from natural language to argumentation models

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Abstract:

Uncertainty and fuzziness pervade natural language both explicitly and implicitly. The explicit presence of uncertainty and fuzziness is exemplified by statements like "I believe that tomorrow will probably be a bit colder than today", while the presence of implicit uncertainty and/or fuzziness can be referred to background domain knowledge, e.g. in the statement "Tomorrow will be rainy because the weather forecast says so", it is part of the background knowledge that weather forecasts are uncertain and that the notion of being rainy is not crisp.

Argument mining, namely the task of automatically identifying and analyzing arguments in natural language texts, is receiving an increasing attention from the research communities of formal argumentation and computational linguistics, since the argumentation paradigm provides a very general and intuitive model of human communication, interaction and reasoning activities.

Most current formal (or semi-formal) argumentation models however allow for very limited ways, if any, to express explicit uncertainty and fuzziness within argument structure. On the one hand, there are several proposals to encompass uncertainty (mainly adopting a probabilistic representation) and fuzziness within the formalism of Dung's argumentation frameworks, which however is not suitable for a direct representation of natural language arguments since it lies at a too abstract level. On the other hand, several models which are meant to capture more closely the way humans conceive and produce arguments, like Walton's argumentation schemes, up to now do not encompass explicit forms of uncertainty or fuzziness. Further, dealing with implicit uncertainty in formal argumentation is largely an open question.

This evidences a big gap between current argumentation models and the capability of faithfully capturing the information conveyed by natural language texts: in particular, the use of current models implies a drastic simplification in (or, simply, the suppression of) the representation of uncertainty and fuzziness.

The talk will discuss the modeling challenges posed by the presence of uncertainty and fuzziness in natural language texts (first of all the problem of defining a suitable ontology for these concepts, e.g. in order to distinguish different kinds of uncertainty) and analyze some research directions aiming at addressing these challenges in the context of argumentation models.