Using Argumentation Schemes for Argument Extraction: A Bottom-Up Method

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ABSTRACT

This paper surveys the state-of-the-art of argumentation schemes used as argument extraction techniques in cognitive informatics and uses examples to show how a series of connected problems needs to be solved to move these techniques forward to computational implementation. Some of the schemes considered are argument from expert opinion, practical reasoning, argument from negative consequences, fear appeal arguments, argument from commitment, argument from inconsistent commitments, and the circumstantial ad hominem argument. The paper shows how schemes need to be formed into clusters of sub-schemes work toward a classification system of schemes from the bottom up, and how identification conditions for each scheme can be helpful for argument extraction.

Keywords: Argument Mining, Carneades Argumentation System, Classifying Types of Arguments, Identifying Arguments in a Natural Language Text

1. INTRODUCTION

Applying argumentation schemes to computational argument mining of natural language discourse has turned out to exhibit a variety of problems, especially in borderline cases where there is disagreement about how to identify a particular argument as fitting one scheme or another. These problems, however, appear to be solvable. To move the research efforts on argument extraction using argumentation schemes ahead, some useful resources are presented in this paper, as well as some first steps on how to solve these problems. The paper begins with survey of the literature, and an identification of the most significant problems confronted by the existing research, by introducing the key schemes in an expository way, and by using examples of standard difficulties in determining whether an argument found in text can properly be said to fit one or more of the schemes. One example is the difficulty of deciding whether a given argument in a natural language text is a personal attack argument (ad hominem argument) or merely an instance of argument from inconsistent commitments (Walton, 1998). Another example is that of the fear

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appeal argument scheme, which is a species of argument from negative consequences and closely related to the scheme for argument from threat.

It is shown in the paper how argument extraction is closely related to the project of argument scheme classification, and how it would be very useful for setting up projects of argument mining to have a classification system showing how one scheme can precisely be classified as a subspecies of another scheme that it is closely related to. The traditional way of classifying argumentation schemes has been to take a top-down approach that lays down some broad, general categories of types of arguments (deductive, inductive, source-based, and so forth) and work downward from there (Walton, Reed, & Macagno, 2008, ch.10). This paper takes a bottom-up approach that begins with some examples at the ground level of cases where two schemes seem to apply to the same real example of an argument found in a text, leading to a difficulty of determining which scheme fits the argument. The idea is that working from the bottom up, we can identify clusters of schemes that fit together with each other, and then at the next step upward, we can see how these clusters can be fitted together. Eventually, once enough of these clusters are fitted together into larger groups, we can see how what we have matches the various top-down scheme classification systems that have been proposed, or not.

Section 1 introduces the reader to the subject of how argumentation schemes are modeled in computational argumentation systems in a format that includes a set of critical questions matching each scheme, using the examples of the scheme for argument from expert opinion. Section 2 shows how the Carneades Argumentation System deals with the critical questions matching this scheme. Section 3 offers a brief survey on recent work on using argumentation schemes for argument mining. Sections 4 through section 7 uses examples of how one scheme can be classified as a sub-scheme of another to illustrate why the work of classifying schemes has encountered some significant problems. The example presented in section 5 fits a scheme for argument from inconsistent commitments, and in section 4 it is shown how this scheme is a sub-scheme of another one called the scheme for argument from commitment. In section 6 both schemes are classified as parts of a more complex scheme called the scheme for the circumstantial ad hominem argument. In section 6 an example of argument from negative consequences is presented, and in section 7 it is shown how this scheme is closely related to the schemes for practical reasoning and argument from values. Section 8 presents guides to help coders extract arguments using 25 of the most important schemes for natural language argument extraction. Section 9 provides some general conclusions of the paper.

2. INTRODUCTION TO ARGUMENTATION SCHEMES AND CRITICAL QUESTIONS

Argumentation schemes represent stereotypical patterns of reasoning used in everyday conversational argumentation, as well as in a variety of other contexts as well, including forensic debating, legal argumentation, scientific inquiry and deliberations that aim at a decision on what to do in given circumstances. Historically, the study of them has evolved from so-called topics (argument places) of Aristotle. Hastings (1963), Perelman and Olbrechts-Tyteca (1969), Kienpointner (1986), Walton (1996), Grennan (1997), and Walton, Reed and Macagno (2008) have identified and studied many schemes. Each scheme has a distinctive set of premises and a distinctive conclusion, and schemes represent form of reasoning we are familiar with in everyday thinking and arguing. Schemes represent ways of drawing an inference to a conclusion based on the way we as thinkers and agents can normally expect a familiar situation to go, based on our shared and repeated experiences, subject to exceptions. Schemes are comparable to the deductive forms of
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