Arguments as Narratives

Adam Wyner

Department of Computer Science, University of Liverpool
Ashton Building, Asthon Street, Liverpool, L69 3BX, United Kingdom
adam@wyner.info

Abstract

Aspects of narrative coherence are proposed as a means to investigate and identify arguments from text. Computational analysis of argumentation largely focuses on representations of arguments that are either abstract or are constructed from a logical (e.g. propositional or first order) knowledge base. Argumentation schemes have been advanced for stereotypical patterns of defeasible reasoning. While we have well-formedness conditions for arguments in a first order language, namely the patterns for inference, the conditions for argumentation schemes is an open question, and the identification of arguments 'in the wild' is problematic. We do not understand the 'source' of rules from which inference follows; formally, well-formed 'arguments' can be expressed even with random sentences; moreover, argument indicators are sparse, so cannot be relied upon to identify arguments. As automated extraction of arguments from text increasingly finds important applications, it is pressing to isolate and integrate indicators of argument. To specify argument well-formedness conditions and identify arguments from unstructured text, we suggest using aspects of narrative coherence.

1.   Introduction

There are several lines of research on argumentation: argumentation schemes (Toulmin, 1958; Walton, 1996), abstract argumentation frameworks (Dung, 1995), and text analysis of arguments (Moens et al., 2007; Wyner et al., 2010). In this research context, it becomes increasingly important to identify the well-formedness conditions or properties of the instantiated argument patterns. For this purpose, we propose to apply aspects of *narrative coherence* to identify arguments from text; in other words, arguments are a *species* of narrative, and as such, we can not only consider corpora of argumentative texts as narrative, but also apply tools of narrative analysis to arguments.

In the following, we briefly outline the various strands of research on argumentation, propose a problem to be addressed, outline the means to begin to investigate this problem, and provide a use case with corpora.

2.   Strands of Analysis

Argumentation schemes (AS) were developed in informal logic to represent a range of arguments found in ordinary conversation (Toulmin, 1958; Walton, 1996), where ASs are sterotypical (or normalised), defeasible patterns of reasoning from premises (and exceptions) to a claim. They emerged as part of the analysis of *fallacious* argumentation. For example, we have *Argument from Expert Opinion* where: *An individual is an expert in a domain, and the individual states that a proposition P is true, and P is a statement within the domain, therefore, P is true*; clearly, there are range of ways to critically examine the argument, so it is defeasible. ASs may be said to contrast with arguments that cannot be defeated: *Every man is mortal, and Socrates is a man, so therefore, Socrates is mortal.*

ASs have also been used in formal, computational approaches to argumentation (Bench-Capon and Prakken, 2010; Prakken, 2010; Atkinson et al., 2011): an AS is analysed in terms of its predicates and terms, a semantic model is given, contrasts between elements of the AS are interpreted as attack by other arguments, and the resulting set of arguments in their attack relations can be evaluated in an argumentation framework (Dung, 1995). A range of ASs have been proposed (Walton et al., 2008). Within this formal work, an important contrast remains between arguments made using Propositional and Predicate Logics and those made using ASs. The former are *strict* and can be abstractly stated *irrespective of the content of the propositions or predicates*. On the other hand, ASs are defeasible; it is not apparent that we can abstract from the content, particularly as the mode of critiquing the argument depends on the content in complex ways. For example, in the AS for *Practical Reasoning* about a course of action, whether one should or should not follow the proposed course of action rests on the possibility of *alternatives* to the given action and the consequences of those alternatives.

Another line of research investigates the discourse structure of arguments (Sporleder and Lascarides, 2006; Moens et al., 2007; Wyner et al., 2010), where argument indicators such as *supposing* or *therefore* are used to identify relevant textual passages that indicate elements of an argument. However, we know that textual identification and extraction of ASs is difficult, and there has been little reported success. In part, we claim, this is because the internal structure of ASs in textual terms is poorly understood. Beyond the identification of (sparse) argument indicators, what other features characterise an argument? In particular, what aspects of textual coherence and discourse structure apply (Webber et al., 2011)? In our view, it would be informative to approach the analysis of ASs in terms of narrative analysis since we can decompose the large and complex problem of AS identification into component issues that can be partly, but signficantly, addressed using current tools.

3.   Problem Statement

Structural analysis of language has a long history and has applied virtually all aspects of language from phonology, morphology, syntax, semantics, and stories (Jakobson, 2002; Chomsky, 1965; Montague, 1974; Propp, 1928). A central issue is to account for *systematic linguistic phenomena* from the range of possibilities. For example, given a catalogue of lexical items, only some patterns appear as

well-formed strings that represent noun phrases while others are unacceptable; the patterns go far beyond the normative, grammatical stipulations of grammar books. To account for such patterns, a common analytic strategy is deployed - we define a set of fundamental elements (or features in structured patterns) and conditions on their well-formed combination (as well as manipulations on the patterns). The conditions are induced from the data and may take highly abstract forms, e.g. binding constraints between pronouns and their antecedents. Such an account would take the form of a *grammar*, broadly conceived, which (ideally) covers all and only the well-formed strings of the corpus, or even better, accounts as well for strings not in the corpus, giving the account *predictive power*.

Turning to the topic at hand, we analogise the problem and analysis stated above to argumentation schemes, for which the analytic methodology has not yet been applied. To make the point concrete, we can create an *argument recognition task*. Suppose we sample 10 random paragraphs from different topics on Debatepedia, which is a wikipedia of debates that present both sides of an issue.[1] Given that each of these paragraphs is from an argumentative source, each of them present coherent arguments (to the author's best efforts); we call these the *argument paragraphs*. To this sample, we add 10 paragraphs, from 3 to 8 sentences long, where each sentence of each paragraph is selected randomly from other topics on Debatepedia; we call these the *non-argument paragraphs*. For example (not from this task), we routinely accept arguments of the following form (in the absence of other information):

> **An Argument**
> Suppose: Professor Hayes is an expert in Astrophysics; and
> Suppose: Professor Hayes states that the Andromeda galaxy is 2.7 million light-years from our galaxy; and
> Suppose: that Andromeda galaxy is 2.7 million light-years from our galaxy is an astrophyical statement; so
> Therefore, Andromeda galaxy is 2.7 million light-years from our galaxy.

However, the following is incomprehensible, even if it has a similar overall form of an argument.

> **A Non-argument**
> Suppose: six teenagers were arrested after a crime spree; and
> Suppose: it's traditional to have a Thanksgiving meal with a family; so,
> Therefore, earthquakes can be expected in San Francisco.

How do we explain the intuitive difference between the argument and the non-argument?

Thus, we have an analogy to the comparison between well-formed sentences and sentences constructed from random words. The question is: can we reliably, intuitively distinguish argument paragraphs from non-argument paragraphs in our corpus of 20 paragraphs? The extent to which we can suggests that we have some intuitive criteria by which we can 'recognise' an argument. We would then want to formalise and operationalised the analysis.

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[1] Accessed March 30, 2012.
http://debatepedia.idebate.org/

4. The Narrative Move

Our proposal is to apply discourse and narrative analytic concepts and tools to the analysis of ASs, trying to see what light such an approach sheds on the analysis of arguments. Among the questions to consider are:

- Is there a 'characteristic' temporal and aspectual structure, e.g. simple present tense in all sentences?

- Are arguments specified within ontological domains, and which classes and relations give rise to well-formed arguments?

- Do the individuals referred to in the argument bear a particular range of thematic or narrative roles?

- How do discourse indicators and propositional attitute verbs signal argument components?

- How do pronominal anaphor and ellipsis reinforce argument coherence?

Answering these questions, we can begin to formulate a 'data representation' suitable particularly for narrative coherence of arguments. By defining such a data structure, we would specify the linguistic elements that contribute to the construction of the argument, then use them in a semi-automated text analytic tool to identify arguments.

5. Towards a Tool

We propose to use the General Architecture for Text Engineering (GATE) tool for text analysis (Cunningham et al., 2002; Wyner et al., 2010; Wyner and Peters, 2010). Some of the textual elements above can be examined with existing GATE components (e.g. tense, discourse indicators, thematic roles, and pronominal anaphora) while others must be constructed (ontological structure and propositional attitudes). Our approach uses both manual and automated annotation interactively, where the tool automatically *highlights* relevant textual components that signal argument passages for manual annotation; identification of these passages with signalling indicators can then be used in the development of higher level argument identification. At the workshop, we intend to demonstrate the components of the tool and its application to interactively assist users in identifying argumentative passages in text.

6. Use Case

We propose the analysis of arguments in Debatepedia as our initial use case and corpus. The advantage of this data set is that it is already partially constructed, which can be useful in scoping the problems and identifying argument elements. We will apply manual and automatic annotation techniques to begin to address the questions raised above.

7. Acknowledgements

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