Natural is Uncertain, Emotional, Deceptive and Still Other. But: How to Get it?

Position Statement and Questions

Fiorella de Rosis[1]

Linguists seem to agree since long in claiming that a 'good' argumentation system should be keen in selecting the arguments that are 'strong' in given circumstances, by envisaging counter-arguments and producing counter-counter arguments (in advance if needed, or on request), in order to eventually produce a well formatted, coherent and 'convincing' message. Argumentation theories go back to the origins of our culture and AI researchers should apparently only find out appropriate techniques to produce such natural results. However, artificial argumentation systems are still far from being natural: indeed, obstacles still found in the production of a satisfying solution are due, in my view, to the unclearness of some concepts in these theories. I'll try to list some of these problems, in the hope that they may contribute to the Workshop discussion.

1 Strength of arguments and theories to treat them

Is an argument strong in itself or does its strength vary according to the Hearer to whom it is addressed and to the context in which the interaction occurs? How should strength be measured? Is there only one measure of strength ('probative weight' or 'plausibility', or 'impact') or should several variables be combined to produce an overall measure of argument strength? If so, which numerical parameters should be associated with the various elements that constitute 'an argumentation scheme' and with the data, to enable calculating its strength when applied to these data?

I am inclined for avoiding to 'invent an *ad hoc* theory' to measure and combine the argument strength: probability and utility theories provide a comfortable environment in which to place such a problem. Belief networks and inference diagrams enable us to represent chaining of arguments and propagation of uncertainty along this chain, from possibly uncertain evidence. They allow, as well, to define how to measure different concepts that contribute to establishing an argument 'strength'; for instance: 'warrant's qualifier' , 'uncertainty in the belief about data', 'impact of data on the 'claim', 'plausibility of data and claim to the Hearer', 'complexity of an argument' (to the Speaker and to the Hearer), 'cost of failing in convincing the Hearer', and so on. Finally, they provide a vivid representation of the strength of those arguments in which 'information sources' are cited (such as in Walton's "Argument from position to know" or "Appeal to Expert opinion" [**?**]), by enabling a definition of 'positive and negative competence' (the equivalents of 'sensitivity and specificity', in epidemiology), 'positive and negative sincerity', 'informativeness' of the source and how these measures affect the plausibility of the communicated data.

2 Building argumentation chains from argumentation schemes

Belief networks (BNs) [**?**] are not a novel formalism, in argumentation. They have been applied, for instance, by Zukerman [**?**] to build a prototype system that produces, at the same time, arguments and answers to rebuttals. But do arguments produced by these systems show the characteristics that would enable us to label them as 'natural'? Not yet, I believe. Although 'insincere' argumentation may be simulated (and this is, in my view, a clear sign of naturalness [**?**]), the natural language texts produced by these systems are not much 'natural'. In addition, counter and counter-counter argumentation (rebuttals or responses to them) is still weak. An explanation of this limit is that BNs (as they have been employed so far) do not represent the rich linguistic, psychological and rhetorical knowledge that is embedded in argumentation schemes. They are often not much more than chains of logical rules to which uncertainty, measured in probability terms, is associated. To make BNs more knowledgeable, some semantics should be associated with their nodes and arcs. A rule that results from applying Walton's "Appeal to Expert Opinion" schema might be formulated, for instance, as follows:

(Say X f) and (Expert X f) $\Rightarrow^{?}$ (T f), with
(Competent X f) and (Sincere X f) $\Rightarrow^{?}$ (Expert X f)
(NegCompetent X f) and (F f) $\Rightarrow^{?}$ (Bel X f)
(PosCompetent X f) and (T f) $\Rightarrow^{?}$ (Bel X f)
(NegSincere X f) and (Say X (f) $\Rightarrow^{?}$ (Bel X f)
(PosSincere X f) and (Say X f) $\Rightarrow^{?}$ (Bel X f)

where X is an Agent, f is a fact and the symbol $\Rightarrow^{?}$ should be read as a 'probabilistic implication' and represented in terms of conditional probability tables. This would enable representing, in the BN, the knowledge that is needed to answer, after the argument: "*The fact f may plausibly be taken to be true because X asserts that f is true*", critical questions such as those mentioned by Walton: "*But how competent and sincere is X as a source? Is X's assertion based on evidence?*" (questions that are aimed, in this case, at checking the truth value of major or minor premises) or "*X is not an expert in the subject domain to which f belongs!*" in which the truth value of a premise that was not mentioned explicitly in the argumentation text is evoked. Another advantage of this formalism is that it enables relaxing the difference between 'observable' and 'not observable' data:

[1] Department of Informatics, University of Bari derosis@di.uniba.it http://aos2.uniba.it:8080/IntInt.html

Workshop on *Computational Models of Natural Argument*
Edited by Giuseppe Carenini, Floriana Grasso and Chris Reed
ECAI 2002. *15th European Conference on Artificial Intelligence*

as evidence about any node in the network may be propagated, argumentation may be chained in any direction: back from data to other data (the typical means-end reasoning) or forward from claims to other claims (a 'hypothetical reasoning about the implications' of a claim). For instance: when I come to know that (Say X f) and (T f), I may update my belief on X's expertise about f.

However, in translating argumentation schemes into BNs, several problems arise. First of all: how may rebuttals should be represented in these networks? This sends us back to a more basic question: Are Toulmin's rebuttals the same as Walton's critical questions, or are they something different? In the previous example, several objections might be made to the argument: "*The fact f may plausibly be taken to be true because X asserts that f is true*". Some of these objections are the critical questions mentioned by Walton, in which an objection is made about some (direct or indirect) premise of the scheme. But objections of a different kind might be raised, by evoking other argumentation schemes (in the previous example, "Appeal to popular Opinion"); or by applying the same argumentation scheme to different data, that produce contrasting results: for instance, "*But Y asserts that f is false, and he is an expert too*".

Is this the kind of objection that we call a 'rebuttal'?.

If the answer is 'yes', no problem, apparently: we just add to our BN some more arcs towards the same claim-node, and that's all! Old fashioned 'Expert Systems' would have enabled us to do this by combining uncertainty in the two schemes according to 'parallel' and 'sequential' propagation rules. But no one would propose such an *ad hoc* theory anymore: and, with belief networks, uncertainty due to application of different schemes cannot be calculated incrementally, as if the two knowledge sources were independent of each other. So, to be able to reply to rebuttals, all of the possible rebuttals have to be represented in the BN (which increases considerably the network's complexity!).

3 Intertwining 'pathos' with 'logos'

'Rational' argumentation apparently dominates the domain of psycholinguistics, as many place the kind of argumentation in which emotional factors are evoked, among the examples of 'deceptive' or 'unfair' argumentation. As a matter of fact, though, appeal to emotion and to a scale of values ('pathos' or 'ethos') are frequently applied, in human-human communication, to persuade somebody to perform some action. In Sillince's list of warrants [**?**], for instance, those based on ethical or social rules, or on appeal to goals, are the majority. So, emotions cannot be neglected when reproducing human-like argumentation systems is a goal.

Again, however, emotions are triggered and abandoned according to a mechanism in which uncertainty, weight given to goals, and time decay play a crucial role. Again, then, the emotional impact of a specific argument, for a given Hearer, and in a given context should be modeled through a formalism in which such factors are considered and treated appropriately (again, for instance, belief networks: [**?**]).

But how should emotional arguments be combined with logical ones? Should they, like someone assumes, be a 'last resort' to which to recur only in case of failure of other strategies? Or isn't it more 'natural' to wisely intermingle rational with emotional steps, in an argumentation message? For instance, emotional arguments might be evoked in a shallow and a bit elusive way, while more 'rational' ones might be spelled out more clearly and in detail. This argumentation style might be achieved by applying different methods to translate knowledge in the BNs into natural language messages, in the two cases. Is there any evidence of how this occurs, in human argumentation? Any corpus of data of public domain?

Silly questions? Too general ones? I hope not.

REFERENCES

[1] V Carofiglio, C Castelfranchi, F de Rosis and R Grassano, 'An interactive system for generating arguments in deceptive communication'. Springer LNAI 2175, 2001.

[2] V Carofiglio and F de Rosis: 'Mixed emotion modeling'. *AISB'02*, London, April 2002.

[3] J. Pearl, *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, San Mateo, CA, Morgan Kaufmann (1988).

[4] C. Reed: 'Is it a monologue, a dialogue or a turn in a dialogue?'

[5] J A Sillince and R H Minors: 'What makes a strong argument? Emotions, highly-placed values and role-playing'. *Communication and Cognition*, 1991

[6] J A Sillince: 'Warrant selection for an intelligent argumentation tool', *Applied Artificial Intelligence*, **12**, 1998

[7] D N Walton: 'Argumentation and theory of evidence'. In *New Trends in Criminal Investigation and Evidence*, 2000.

[8] I Zukerman, R Mc Conachy, K Korb and D Pickett: 'Exploratory interaction with a bayesian argumentation system'. *Proceedings of IJCAI* 1999.