

An Interactive Form for Customer Complaints: Matching the Cases

Boris Galitsky*

*School of Computer Science and Information Systems
Birkbeck College, University of London
London, United Kingdom
galitsky@dcs.bbk.ac.uk*

In the last two decades, the interest to formal modeling of various forms of human reasoning and mental behavior has strongly risen, particularly in connection with legal reasoning. A series of phenomena in human reasoning have been reflected in such approaches as reasoning about action and knowledge, space and time, nonmonotonic and counterfactual reasoning, etc. Also, algorithms of information extraction from legal documents that is expected to form an initial knowledge base for further reasoning have undergone dramatic improvement. However, extraction of information about conflicting agents from a plain text (a written complaint) is still hard and unreliable.

We suggest a novel legal application area for machine learning and reasoning – the interactive forms for representation of multiagent conflicts (customer complaints). In this research abstract we explore the role of *mental component* in a natural language legal document, written by a person who is not a legal professional. We call mental component of a text its formal semantic representation that consists from the entities for mental states including *knowledge, belief, intention, desire, dissatisfaction*, as well as entities for mental actions such as *inform, check, reject, appeal, ask*, etc. In this respect we follow along the lines of what is called BDI model, subject to our development in a series of studies.

We choose such a domain as customer complaints because they are primarily descriptions of multiagent conflict, where the mental states and actions of the participating agents are essential. Also, our choice is motivated by a high logical complexity of textual complaints on one hand and availability of a large relatively uniform dataset of complaints on the other hand. In the domain of customer complaints, the general task of understanding a natural language legal document allows a specific and feasible formulation. We pose the task of understanding a customer complaint as determining whether it is valid (justified) or invalid (non-justified). It is then necessary to obtain an accurate description of agent's problems, intentions and opinions from text and to suggest possible ways of its resolution. In our studies [1-3] we have explored a series of logical means to process customer complaints, assuming the ideal natural language information extraction.

Analyzing the experience of previously designed systems for understanding multiagent interaction, one can easily come to conclusion that the performance limitation is caused by the natural language processing unit, because the vocabulary the plaintiffs express their problems is rather extensive and their emotional writing is rather hard to understand (even for humans). Therefore, in this study we focus on the way to efficiently extract information about multiagent interaction, based on the division of the domain knowledge into domain-specific and mental components.

*<http://www.dcs.bbk.ac.uk/~galitsky/complaints.htm>

The back end of the interactive complaint forms includes the following reasoning components:

- Machine learning logic programming-based system Jasmine, capable of predicting the mental action, given the dataset of mental states and actions of a given opponent agent, <http://www.dcs.bbk.ac.uk/~galitsky/JaSMine/JaSMine.htm>;
- Logic programming implementation of reasoning about mental actions, predicting the opponent actions given the explicitly coded pre-conditions and effect axioms;
- Multiagent mental simulator NL_MAMS, which yields the consecutive mental states given the initial one, simulating the decision-making process of agents, http://www.dcs.bbk.ac.uk/~galitsky/Nl_mams/NL_MAMS.htm

Figure 1: A front end of the interactive form.

The interactive form for filing the students' complaints is shown at Fig.1. It is suggested instead of plain text to present a conflict between a student and a tutor. On the left, the student plots her attempts to resolve the conflict, and on the right side the tutor's responses (from the student's viewpoint) are specified. The soundness of a given complaint is determined, using analysis of agents' mental states and experience with previous complaints: the system obtains the complaint status (justified, unjustified).

The deployment of the complaint justification system ComplaintEngine with interactive form has lead to a significant improvement of complaint handling procedure. ComplaintEngine accelerates the complaint response time, increases the objectivity and efficiency in the complaint resolution strategy and decreases the stress and emotional load of the participating parties.

References

- [1] Galitsky, B. and Vinogradov, D. Using inductive reasoning and reasoning about dynamic domains for automatic processing of claims. DIMACS Tech Report #2002-42, 2002, Rutgers University NJ.
- [2] Galitsky, B. and Pampapathi, R. Deductive and inductive reasoning for processing the complaints of unsatisfied customers 16th IEA/AIE Conference, LNAI 2718 Loughborough University, UK 2003.
- [3] Galitsky, B. and Mirkin, B. Building interactive forms to input the scenarios of multiagent conflicts *Proceedings of the 2003 UK Workshop on Computational Intelligence*, 2003.