

# A Logic Programming Framework for Question/Answer Dialogues

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We have build a Database with a set of knowledge bases where each knowledge base has the information conveyed by a Supreme Court Assents. Each knowledge base is built as a consequence of pragmatic interpretation of a text (Rodrigues & Lopes, 1992, 1994). The result of the pragmatic interpretation of a text is a set of text temporal structures, one for each possible interpretation. So each Knowledge base is a set of text temporal structures.

The dialogue system controls both the conversation with the user interrogating the system and the query of the Database with Supreme Court Assents. The user organizes his questions in order to obtain the set of Supreme Court Assents that match the set of characteristics phrased by the user in his question. An illustrative example would be:

Q1: How many Supreme Court Assents there are where an unemployed murdered his wife?

A1: 31

In order to be collaborative and to produce an answer the system should check which knowledge bases entail (the pragmatic interpretation of) the sentence: "an employed murdered his wife", and count them. This process is done through the inference of the users' intentions (to be informed about the number of Supreme Court Assents with a specific characteristic) and the abductive inference of the actions that may satisfy the users' goals. It is this planning process that includes de knowledge base query. Afterwards, the answer is planned and issued. These intentionality and activity features of our system distinguishes it from other theoretical approaches (Pollack, 1990; Quaresma & Lopes, 1995).

In this paper, we assume the user presents some characteristics of the set of texts he wants to see. Depending on the number of texts, he may want to restrict his search space by specifying additional characteristics. In the previous example the user could ask:

Q2: And where he killed her with poison.

A2: 2

When the user poses question Q2, he intends to continue the characteristics presented in Q1. This means that Q2 should be interpreted as:

How many Supreme Court Assents there are where: An unemployed murdered his wife. He killed her with poison.

In order to control this kind of dialogues our dialogue system represents and reasons about the intentions of the user as well as its own intentions. This, together with an adequate representation of time intervals, enables the system to identify an interpretation context for each question. These features allow the system to handle with elegance and with the right cognitive attitudes the following dialogue phenomena:

Ambiguity in the interpretation of the characteristics explicitly phrased by the user in each question.

As we shall present later, this may happen very often and the system must be able to commit itself with one interpretation in order to supply an answer. This means that it must make explicit in its answer the main differences of the possible interpretations of the user question. Note that in the criteria for choosing one interpretation the system may take into account the easiest difference to phrase, not all differences can be phrased.

Parallel sub-dialogues, this phenomena happens when the user phrases some characteristics that are incompatible with others that were phrased in a previous question.

Clarification, an intervention of the user that: informs the system that the interpretation it has chosen is not the one the user intended; and phrases the differences between the system interpretation and the intended interpretation.

The interpretation context of a user question is represented with a set of temporal text structures. For this particular domain (characteristics of supreme court assents supplied by an user in his questions) the text temporal structure is well suitable to solve some discourse phenomena and allows us to detecting inconsistent discourse (namely when there are incompatible characteristics conveyed by the user questions).

## References

- Pollack, M. (1990). Plans as complex mental attitudes. In *Intentions in communication*. Cambridge, MA: MIT Press.
- Quaresma, P., & Lopes, J. G. (1995). Unified logic programming approach to the abduction of plans and intentions in information-seeking dialogues. *Journal of Logic Programming*, 54.
- Rodrigues, I. P., & Lopes, J. G. P. (1992). Discourse temporal structure. *Proceedings of COLING-92*.
- Rodrigues, I. P., & Lopes, J. G. P. (1994). Temporal information retrieval from text. In C. Martin-Vide (Ed.), *Current issues in mathematical linguistics*. North Holland.