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Advantages of Computer-based Approaches to Clinical Guidelines: the Case of the GLARE Approach

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Abstract

Computer-based approaches to clinical guidelines are gaining an increasing relevance within the medical community. We discuss the specific advantages of adopting the GLARE system

Introduction and background

Clinical guidelines are a means for specifying the "best" clinical procedures and for standardizing them. Several computer-based approaches have been introduced to overcome the gap between clinical guidelines as provided by standardization committees and their applicability in the clinical practice [1]. GLARE (Guideline Acquisition, Representation and Execution) is a system which has been built from 1997 in cooperation with Az. Osp. S. Giovanni Battista, Turin, Italy [2]. It is a domain-independent system to acquire, represent and execute clinical guidelines, which has been tested on several guidelines, including asthma, cardiac diseases, ischemic stroke.

Methods

GLARE has a three level architecture. At the highest level, it offers a high-level and easy-to-use interface to physicians. At the intermediate level, it has an acquisition module, to enter a new guideline, and an execution engine, to instantiate a guideline on a patient. At the lower level, it interacts with a DBMS to store clinical guidelines and to interact with patient records.

Results

The adoption of the GLARE system provides several main advantages. As regards the acquisition phase:

1. It provides a high-level graphical interface to introduce clinical guidelines by drawing graphs and filling slots
2. It provides automatic facilities to check the correctness of guidelines, including (i) a terminological check and a check on the correctness of the values of attributes, (ii) a check on the "logical" well-formedness of the graph (e.g., only decision actions may have more than one exiting arc), (iii) a check of the consistency of the temporal constraints in the guideline, based on the adoption of advanced Artificial Intelligence techniques [3]. Moreover, (iv) GLARE is integrated with the SPIN model-checker, to automatically check several kind of properties (e.g., the presence of a therapy with specific properties for a given patient).
3. It provides a module to contextualize a general guideline considering the local availability of resources

As regards the execution phase:

1. It interacts with the Patient DB, so that patients' data are automatically retrieved from it whenever needed
2. It adopts advanced Decision Theory techniques to assist physicians' decision making ("what if" analysis)
3. It checks whether the execution on a given patient is correct, in the sense that the actions in the guidelines are executed, and the temporal constraints in it are respected [3];
4. It provides a schedule of the set of actions to be executed in a given temporal window (e.g., in the next two days)

References

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