Clinical Guidelines Contextualization in GLARE

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Abstract. The adaptation of clinical guidelines to specific contexts is a fundamental task to promote guideline dissemination and use. Several aspects of contextualization need to be faced, including the adaptation of guidelines to local resource availability and (for computer-based guideline approaches) to local software environment. We show how a computer-based approach can help in such a challenging task.

Context. Computer-based tools to manage clinical guidelines are gaining an increasing relevance within the areas of Artificial Intelligence (AI) in Medicine and Medical Informatics. One of the most relevant obstacles to the application, use and dissemination of clinical guidelines is the gap between the generality of guidelines (as defined, e.g., by standardization committees) and the peculiarities of the specific contexts of application. In fact, (1) general guidelines do not take into account the fact that the tools needed for laboratory and instrumental investigations might be unavailable at a given hospital; (2) a sort of “continuous adaptation” has to be supported, to cope with new clinical procedures; (3) computer-based guideline managers must be integrated with the Hospital Information System (HIS), and usually different DBMS are adopted by different hospitals. GLARE (GuideLine Acquisition, Representation and Execution) [1] is a guideline manager which addresses the above contextualization issues.

Methodology. Considering issue (1), in GLARE’s representation formalism, the resources needed by each action of the guideline are explicitly listed in the description of the action itself. We have devised a pre-compilation module, which can be used whenever a guideline has to be installed and adopted in a new context (hospital/department) in order to automatically adapt the guideline to the locally available resources. The module takes in input a guideline and the list of locally available resources, and automatically navigates the guideline in order to prune the branches that cannot be executed because of resources unavailability (of course, proper warnings are inserted). Pruning non-executable alternative paths brings out with a context-dependent guideline, that describes all and only those actions and paths that can actually be implemented in the given context.

Concerning issue (2), in GLARE we are devising a framework to support cooperative update of guidelines. Using such a framework, different physicians can propose different updates to a given guideline. Such updates are then evaluated by a team of supervisors, that can decide to accept or reject them. The history of the evolution of the guideline is also supported, so that one can ask about previous versions of the guideline (e.g., to justify his/her actions on the basis of the knowledge available at the time when the action has been performed).

In order to make GLARE as independent as possible of the specific DBMS used to manage the HIS (issue (3) above), we devised a three-layered architecture. The highest layer (system layer) is composed by the execution and acquisition modules. The lowest layer of the architecture (DBMS layer) contains the DBMS, that physically stores the Database containing guidelines and the Patient Database, while the intermediate layer (XML layer) consists of a set of XML documents (one for each database). XML acts as an interlingua between the system layer and the DBMS layer: the acquisition and execution modules actually interact only with the XML layer, through which they obtain the knowledge stored into the DBMS. The three-layered architecture makes GLARE mostly independent of the DBMS adopted at the particular hospital. In fact, the interaction between the DBMS and the XML layer is devoted to a single software module (a Java package). Changing the DBMS only requires to modify such module and these changes are quite limited and well-localised. Thus, GLARE’s architecture offers a useful support for adapting the tool to the software context.

Conclusions. The GLARE experience demonstrates that the adoption of a computer-based approach can provide several advantages in the process of guideline contextualization.

References