Forward Chaining Inference vs. Binary Decision Support in an Electronic Health Record Application Based on Archetyped Data

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The implementation of computerized health information systems has a potential effectiveness related to the use of decision support engines. Decision engines based on Boolean logic are one of the most prevalent in current implementations, but the complexity of healthcare information does need more robust solutions, especially in fully implemented, semantic-sensitive, electronic health records. The purpose of this paper is to investigate the effects of two common approaches to decision support in Electronic Health Record (EHR) applications. The EHR uses archetyped data based on the multi-level modeling principles initially described in the openEHR specifications which were foundational to the formation of the ISO and CEN 13606 EHR standards. Forward chaining using CLIPS rules was compared to if-then-else constructs in terms of performance and code size. The results showed that forward chaining was much faster and required less coding, besides being more easily to maintain. The accuracy of the forward-chaining engine was 100%, considering the Boolean-based engine as the gold standard. This study confirms the validity of CLIPS-based inference engines for decision support in healthcare.

Keywords:

Computer-assisted decision making, Clinical decision support systems.

A View on the Current State of the MedFrame/CADIAG-IV Project

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CADIAG-IV is a data-driven fuzzy diagnostic expert system for computer-supported consultation in internal medicine based on the PC-based medical expert system shell MedFrame. MedFrame provides a medical institution with a set of powerful tools for developing knowledge bases and inference mechanisms and applying them as expert systems in clinical routine. CADIAG-IV is the first expert system completely based on MedFrame, significantly extending the usage of fuzzy concepts compared to its predecessors CADIAG-II and -III. After the implementation of the MedFrame core components, a high level inference engine for rule-based knowledge bases has been implemented and used for the realization of the CADIAG-II/-III inference process. In addition, the CADIAG-II/RHEUMA knowledge and patient data have been transferred from the original IBM host system to MedFrame. Currently, the realization of the CADIAG-IV inference, the integration of additional MedFrame components, and the implementation of the user interfaces is in progress. The results achieved so far confirm the applicability, correctness, and performance of the MedFrame concept and the CADIAG re-implementation.

Keywords:

Medical expert system, MedFrame, CADIAG, Fuzzy logic, Rheumatology.