A NEURO-FUZZY AND SEMANTIC CAUSAL REASONING APPROACH TO CLINICAL DECISION SUPPORT SYSTEM

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ABSTRACT

Clinical Decision Support System (CDSS) is a health information system which is designed to facilitate physicians in decision-making process. However, it remains a challenge to successfully provide and implement CDSS in clinical practice. One of the issues is regarding the limited provisions of causal reasoning and evidences in existing CDSS. These are necessary for showing the relevance and reliability of system outcomes and help physicians in making proper decisions. This study has proposed a CDSS model that consists of two modules. The Neuro-Fuzzy Learning Module represents the use of Neuro-Fuzzy technique for making predictions, while the Semantic Causal Reasoning Module represents the use of ontology for integrating medical domain knowledge with causal reasoning, decision support, and supporting evidences. The proposed CDSS model was developed and evaluated based on clinical case of drug addict's therapy (i.e. prediction of optimal methadone doses). The results demonstrated that our CDSS model is feasible as the obtained performances of Neuro-Fuzzy prediction model showed a good accuracy. Moreover, our ontology model contains good quality and the information represented by our ontology was generally accepted and acknowledged by medical experts. As a result, our CDSS model able to provide full support for provision of causal reasoning and evidences compared to other CDSS models, and hence these signify the contributions of this study.

Keywords: clinical system, decision-making, causality, evidences