Smart CDSS: Knowledge Acquisition and Modeling using Mind Maps and Decision Trees

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Abstract— Clinical practice guidelines (CPGs) is one of the key knowledge resources used in medical domain. CPGs are mainly available in an un-structural and a semi-structural form. For a concrete knowledge, domain expert rigorously investigates the CPGs and convert them into a human readable and computer interpretable format. In this paper, we demonstrate knowledge acquisition and its modeling from the oral cavity cancer guidelines using Mind Maps and Decision Trees (DTs).

Keywords—Mind Maps; Decision Trees; Clinical Practice Guidelines; Clinical Decision Support System

I. INTRODUCTION

A CDSS plays a pivotal role in healthcare while improving the patient care and reducing the chance of errors. The key quality of CDSS services is based on a well-represented knowledge supported by trusted knowledge resources. CPGs are considered trusted in medical domain. However, CPGs in published form are not computer interpretable due to its unstructured format. This paper demonstrates the method of representing CPGs in Mind Maps and conversion to DTs.

II. METHOD

A. Investigating CPGs and devleoping Mind Maps

The first most important step in knowledge creation is to define the objectives of CDSS intervention and select appropriate CPGs. Second, while targeting the intended objectives, the structural CPGs are investigated by the domain
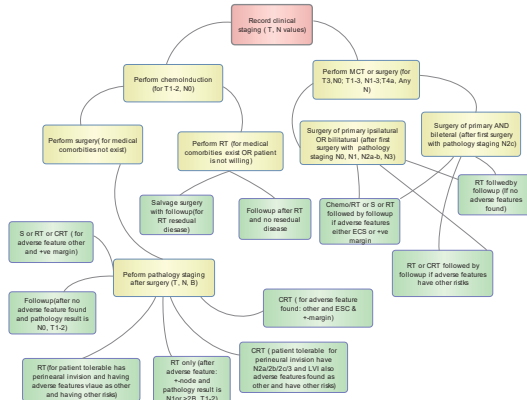

Figure 1: Oral Cavity Cancer Mind Map

experts. The initial sketch is drawn with high level concepts represented as "Central Topics", "Main Topics", and "Topics" with appropriate relationships. Third, the domain expert finalizes the model into a refined Mind Map.
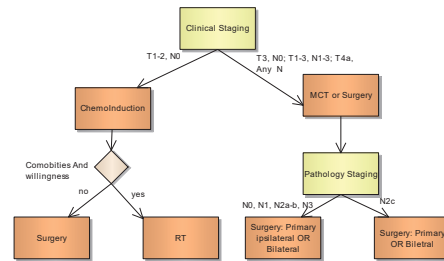

Figure 2: Oral Cavity Cancer DT

B. Coversion of Mind Maps to Decision Trees

Mind maps are human understandable but represents the knowledge only at a high level. To make the knowledge explicit, a conversion from Mind Maps to a concrete knowledge representation such as DTs is required. The conversion process includes: identifying and isolating candidate conditions and actions, and drawing appropriate branches to reflect the actual knowledge.

III. RESULTS: CASE STUDY

This work is carried out as a part of Smart CDSS in the area of head and neck cancer. Figure 1 & 2 depict the partial knowledge representation for oral cavity cancer.

IV. CONCLUSION

This paper proposes the knowledge acquisition for CDSS from CPGs using Mind Maps and DTs. The method is demonstrate with oral cavity cancer and the knowledge is used in a real project of Smart CDSS.

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