

4.11 A Prototype Diagnostic Expert System for Common Respiratory Diseases Using Dempster Shafer Theory.

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ABSTRACT

Medical diagnostic investigations are inherently very complex. The doctor is faced with a patient who has his own personal experiences, knowledge from books, and beliefs. The doctor notes the patient's signs and symptoms, combines these with the patient's medical history, physical examination and laboratory findings and then diagnoses the disease. Medical decision-making and particularly the establishment of a diagnosis is an error-prone process. Computers can be used effectively to assist the physicians in the process of diagnosis. Various methods have been followed in order to computerize the process of medical diagnosis [1]. A prototype medical diagnostic system was developed to diagnose five respiratory diseases using fuzzy logic in [2]. Fuzzy logic had been identified to have a few drawbacks when used for medical diagnosis as suggested in [3]. Dempster Shafer theory provides a suitable framework for the incorporation of medical knowledge. As suggested in [3] Dempster Shafer theory provides a method of using evidential reasoning for diagnostic inference. In this paper a decision support mechanism is attempted utilizing five respiratory related diseases with similar presenting clinical features, which are hard to tell apart for the non expert. The medical knowledge in the system is represented by Basic Probability Assignment (BPA) values pertaining to all the clinical features and diseases considered. The inference mechanism relies on the Dempster's rule of combination. The output of the system is diagnostic hypotheses along with a belief measure for each disease. The belief values are calculated using limiting functions based on belief and plausibility. A clinical validation of the system is currently underway at the Teaching Hospital Peradeniya (THP). The preliminary results have proved to be conducive and identified shortcomings are to be addressed in the future.

Keywords: Medical diagnosis, Expert systems, Dempster Shafer Theory.

References

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