Diagnostic Test Suggestion via Bayesian Network of Non-expert assisted Knowledge Base

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Abstract—The Japanese public health system relies upon a mandatory insurance scheme that subsidizes every medical procedure. This causes some practitioners in doubt to order unnecessary exams, especially in departments like the emergency room (ER) (where time and personnel constraints apply), generating additional costs for the public health system. In this context arises the need and challenge of developing a computer application based on Artificial Intelligence that, given a patient's symptoms upon entering the ER, recommends the most appropriate exams to increase the accuracy of the diagnosis. This paper presents the preliminary results on the development of such a tool using a Bayesian Network (BN). Although there is a lot of literature on BN for medical diagnosis, this work is innovative as it is focused on suggesting useful exams based on pre-test probabilities, and that it was built using only medical data and other freely available information sources. A fundamental disease list was established using a Human Symptom-Disease Network (HSDN) containing symptom-disease relationships. The co-occurrence between disease and symptom terms on the HSDN was translated into rough sensitivity and specificity estimates and used to set the conditional probabilities of the BN. Prior probabilities of diseases were estimated using hospital data of regular and emergency visits. Information about findings (exams) and their sensitivity- specificity data was scraped from web databases and mapped into the network. Preliminary tests for inspecting the accuracy of the developed tool were made with the help of a medical expert, based on relevant literature. Obtained results show that the tool is able to find differential diagnoses for most cases. This work opens the door for future improvements of the system.

Keyword—Exam Recommendation, Medical cause, Bayesian Networks, CDSS, e-Health

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