Associating Risks of Getting Strokes with Data from Health Checkup Records using Dempster-Shafer Theory

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Abstract—**Prediction of future diseases from historical data of medical patients is a topic that has gained increasing interest given the growing availability of such data in electronic format. Most of the developed systems are based on machine learning techniques, which are good to find relations between data but do not help explaining causalities. In particular, it would be difficult to get a meaningful medical explanation for the relationship between a patient's health checkup data and the risk of developing a certain disease. On the other hand, expert system approaches, like Bayesian networks, are based on medical knowledge but have trouble dealing with high levels of uncertainty, which is crucial in this kind of scenario. In this work we present a prediction system for the risk of a patient having a (heart or brain) stroke based on past medical checkup data. The system is based on the Dempster-Shafer Theory of plausibility which is good for handling uncertainty. The data used belongs to a rural hospital in Okayama, Japan, where people are compelled to undergo annual health checkups by law. The model also produces rules that are able to relate data from exam results with the aforementioned risk, thus proposing a cause from the medical point of view. Experiments comparing the results of the Dempster-Shafer method with other machine learning methods like Multilayer perceptron, Quadratic discriminant analysis and Naive Bayes show that our approach performed the best in general, with an overall prediction accuracy of 61% and with the best precision value on true positive cases of stroke.**

Jorge Quinteros was born in Santiago, Chile in 1992. Graduated from Terra Nova High School in 2010 to join Universidad de Chile's Faculty of Physical and Mathematical Sciences in 2011. He obtained a Bachelor's degree in electrical engineering and a Bachelor's degree in computer science engineering in 2016, both from Universidad de Chile, Santiago, Chile. He is now on his way to obtaining a Master's degree in computer science from the same institution.

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