システム情報工学研究科修士論文概要

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論文題目

Mining Diagnostic Rules in Medical Field using Formal Concept Analysis and Various Types of Neural Networks

(形式概念分析および各種ニューラルネットワークによる医療データからの早期診断ルール抽出)

論文概要

Computer-aided diagnostic systems using mechanism of artificial intelligence, one of them is Artificial Neural Networks (ANN), have been increasingly implemented to provide assistance in medical diagnosis. This research aims to address two problems: first, to provide the understanding of the implicit knowledge which held by the ANN in its application in the medical field; and second, to propose a method of early diagnosis of a medical case of Dengue Hemorrhagic Fever (DHF) using clinically observed symptoms. The proposed method is to obtain diagnostic rules of DHF by extracting implication rules from trained ANN using Formal Concept Analysis (FCA). First, neural networks are trained using DHF and not DHF data to build a prediction model. Then a synthetic dataset is created and discretisized using FCA method to generate formal context and formal concepts from the dataset. Last, the implicit knowledge is extracted from the concepts in the form of implication rules. Experiment shows that different level of parameter discretization will affects the level of details obtained in the rules. For the given cases, obtained rules by Backpropagation Neural Network (BPNN) successfully represent the DHF diagnosis by 97.5% validity, while the Radial Basis Function Neural Network (RBFNN) was able to reach 100% verification score. By confirmation to the medical expert, it is concluded that the rules were able to reflect the actual condition of initial diagnosis of DHF.

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