Novel logic mining incorporating log linear approach

ABSTRACT

Mining the best logical rule from the data is a challenging task because not all attribute of the dataset will contribute towards the optimal logical representation. Even if the correct attributes were selected, wrong logical connection in the logical formula will lead to suboptimal logical representation of the datasets. These two factors must be carefully considered in creating more robust logic mining method. In this paper, we proposed a novel logic mining by introducing log-linear analysis to select the best attributes which formulate the logical rule that will be embedded into the energy-based ANN named Discrete Hopfield Neural Network (DHNN). In log-linear phase, the test of the association for each attributes will be carried out where the attributes that have a significant level less than α will be selected before proceeding to the logic mining phase. By using DHNN, the selected attributes via log-linear will be learned and retrieved the optimal induced logic with classification ability. The proposed hybrid model has been tested using various real-life datasets and was compared with several established logic mining methods. Based on the findings, several winning points for the proposed model where the proposed model dominates 3 metrics out of 5 in the average rank. The metrics that achieve the highest average rank are Accuracy (1.800), Precision (3.500), and Mathews Correlation Coefficient (2.700). In accordance with the experimental result obtained, the proposed model has achieved optimal performance with a statistically significant p-value. Hence, these findings lead to an advancement of the existing logic mining via the statistical method.