Using BTA Algorithm for Finding Nash Equilibrium Problem Aiming the Extraction of Rules in Rule Learning

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Abstract

It is crystal clear that discovering the rules for finding a specific pattern among given data for extraction of association rules and rule-based learning systems has been defined. There is much research that make use of game theory for the processes contributing to discovery of rules. In recent years, modeling based on game theory in rule learning sphere has gained much more attention by computer scientists. When there is independence between the strategies used by two or more different players the strategy game modeling could be used. In this view, strategic play is a desirable model for situations with no permanent strategic relationship among interactions. In addition, Nash equilibrium is the most widely used solution concept in game theory. This concept is a state-of-the-art interpretation of a strategy game. Each player has an accurate prediction of other players' behavior and acts according to such a rational prediction. In the present study, by extracting rules from frequent patterns we have presented a model that can extract learning rules by abstraction based on game theory, which can be used not only for association rules but also for rule-based learning systems. Also, the introduced method can be easily generalized to fuzzy data. To Find Nash Equilibrium (FNE) in the proposed method, we used meta-heuristic Bus Transportation Algorithm (BTA).The results indicated that the method reduces computational complexity in the associate rule discovery process and rule learning, provided that FNE is solved.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

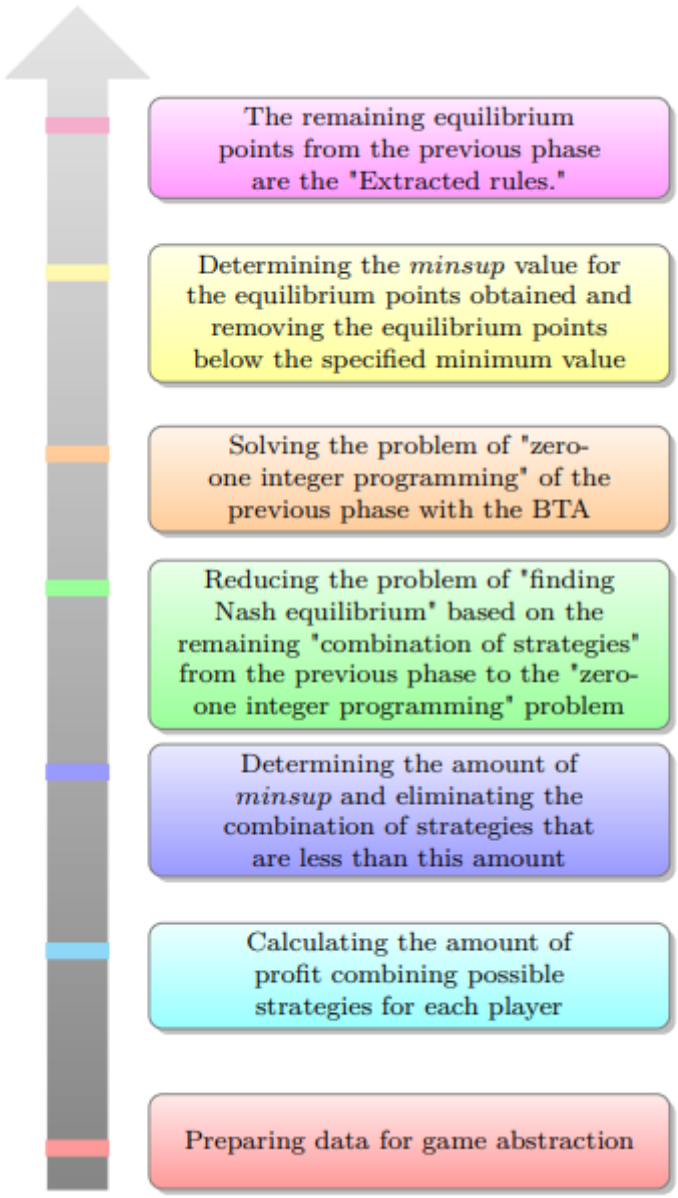

Figure 1

Phases of rule extraction in a rule learning system using game theory and BTA

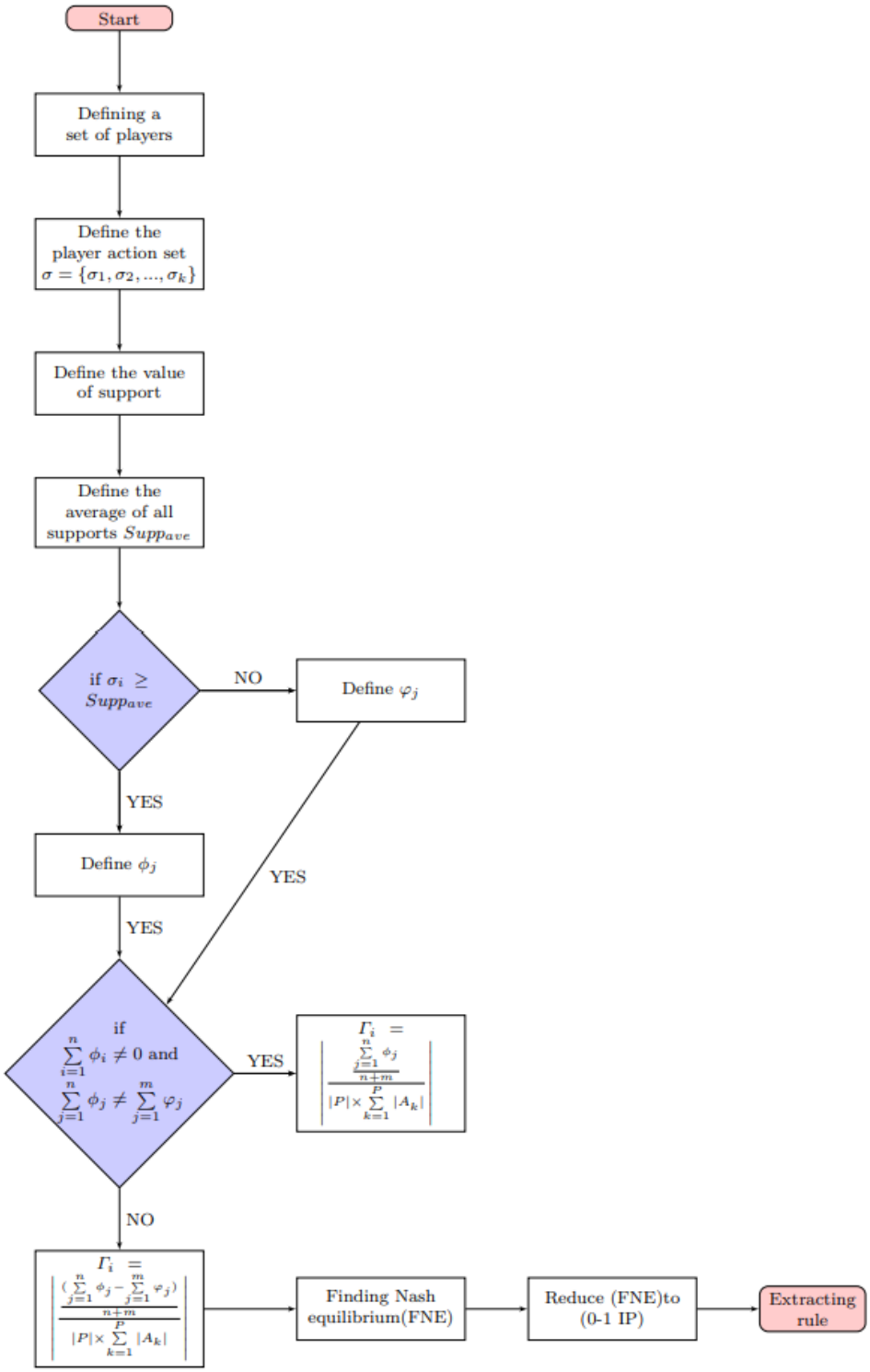

Figure 2

Extracting rules with the proposed method

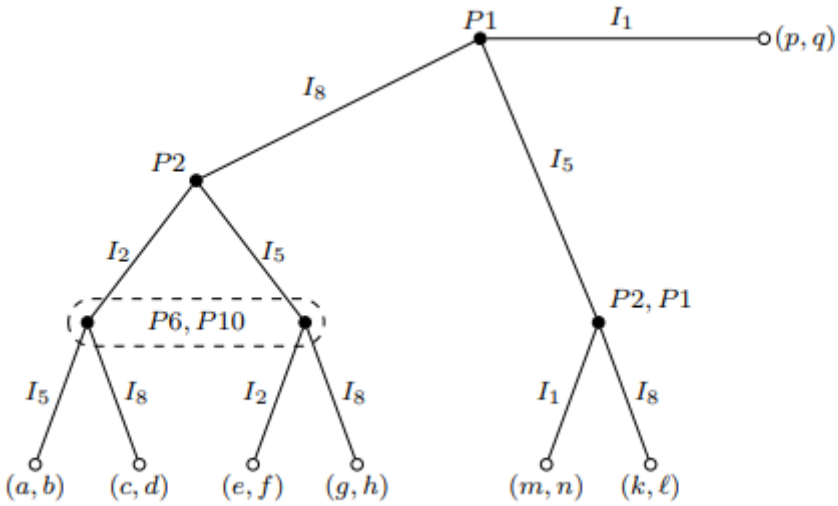

Figure 3

Part of the game tree form

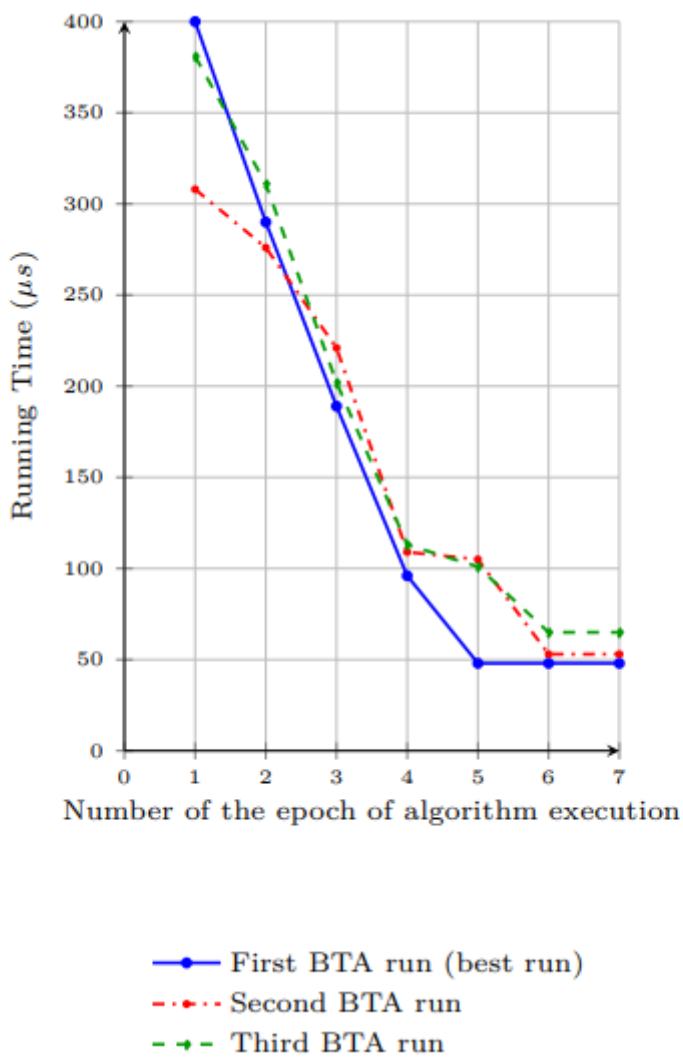

Figure 4

Top 3 BTA performances in terms of convergence speed to the optimal solution (finding Nash equilibrium points)

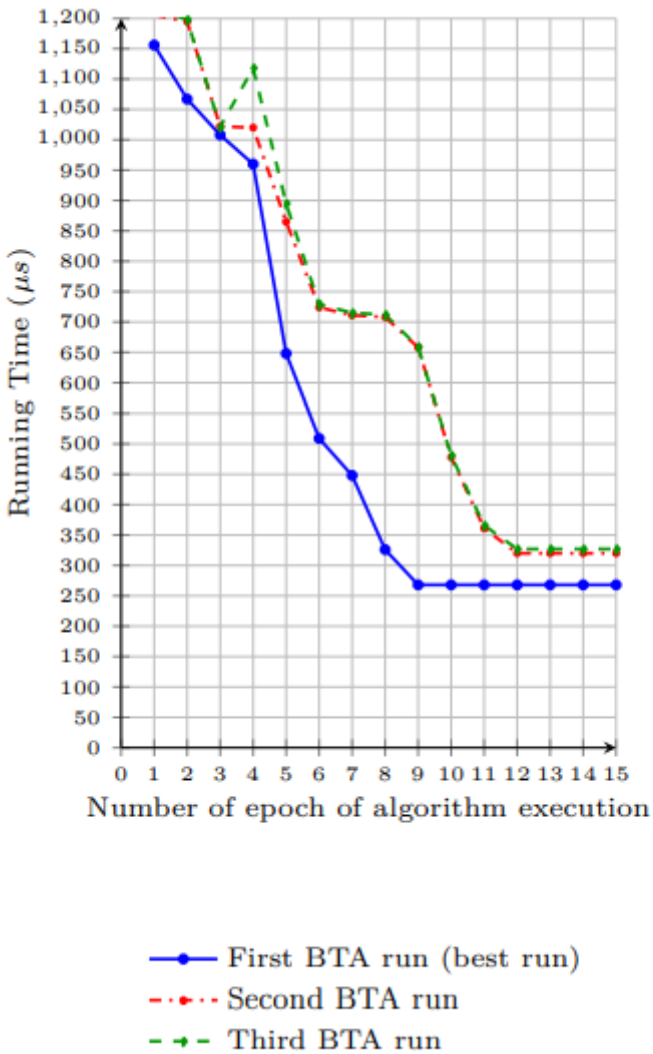

Figure 5

Top 3 BTA performances in terms of convergence speed to the optimal solution (finding Nash equilibrium points)