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# RMRL: improved regret minimisation techniques using learning automata

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## ABSTRACT

and their decisions in such incomplete-information problems, make it necessary to use some learning techniques to enhance the decision-making process. Reinforcement learning techniques are studied in this research; regret minimisation (RM) and utility maximisation (UM) techniques as reinforcement learning approaches are widely applied to such scenarios to achieve optimum solutions. In spite of UM, RM techniques enable agents to overcome the shortage of information and enhance the performance of their choices based on regrets, instead of utilities. The idea of merging these two techniques are motivated by iteratively applying UM functions to RM techniques. The main contributions are as follows; first, proposing some novel updating methods based on UM of reinforcement learning approaches for RM; the proposed methods refine RM to accelerate the regret reduction, second, devising different procedures, all relying on RM techniques, in a multi-state predator-prey problem. Third, how the approach, called RMRL, enhances different RM techniques in this problem is studied. Estimated results support the validity of RMRL approach comparing with some UM and RM techniques.

KEYWORDS: Incomplete-information games, predator-prey problem, regret minimisation, reinforcement learning

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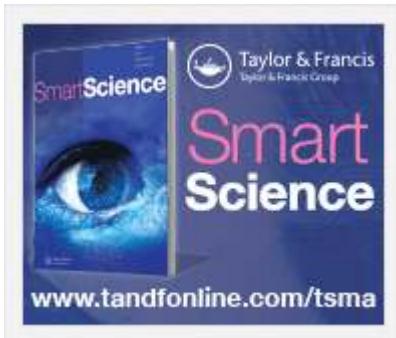
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