A BUDGET-DRIVEN, ENERGY-EFFICIENT WORKFLOW SCHEDULING APPROACH IN CLOUD COMPUTING WITH MINIMUM MAKESPAN

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Abstract

Cloud computing can be defined as a technology that provides services to external users over the internet by utilizing the central remote servers. It has become a very important and popular concept among many computer users mostly due to the unlimited storage capacity and high performance. Scheduling the workflow tasks of cloud computing has become a prominent issue and has been a very popular topic in the research area mainly due to the impact it has on the performance of cloud computing. Even though there are many researchers conducted in the area of workflow scheduling, there is no proper solution built for workflow scheduling by thoroughly investigating and considering the main objectives such as budget constraint, energy constraint, makespan, load balancing, etc. The developed RL-based scheduling algorithm will provide a near optimal solution for the scheduling problem by considering the makespan and cost QoS requirements. The algorithm is developed using machine learning and reinforcement learning. The algorithm contains a prediction model to predict the execution time and cost of tasks which is used by the reward function to calculate the reward for the selected action. The algorithm is tested and evaluated with several domain experts and it is compared with other existing algorithms. The results obtained through evaluation and benchmarking show that the developed algorithm can give near optimal solutions for the workflow scheduling problem in cloud computing.

Keywords: Reinforcement learning, Q learning, Machine learning, Cloud computing, Workflow scheduling