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Abstract The spot market is one of the most common cloud markets where cloud providers, such as Amazon EC2, rent their surplus computing resources at lower prices in the form of spot virtual machines (SVMs). In this market, which is often managed through an auction mechanism, users seek optimal bidding strategies for renting SVMs to minimize cost and risk. Uncertainty in the price of SVMs and their low availability/reliability is a challenging issue to bid on the user side. In this paper, we present a robust model for minimizing the cost of executing tasks by considering the uncertainty of the price of SVMs based on the Information Gap Decision Theory (IGDT). It evaluates the risk-aversion and the risk-seeker nature of the user's bidding strategy and measures the cost of risk/immunity. The main advantage of this method is that it formulates user decisions without the need for any presumption about the price distribution of SVMs. With this decision-support system, users can rely on the predicted confidence intervals to make the optimal bid for future time slots according to the selected risk level. The results are compared with Monte Carlo simulations and a scenario-based approach to evaluate the effectiveness of the proposed IGDT-based model. Evaluation results based on historical Amazon EC2 prices confirm the efficiency of the proposed method to handle the uncertain nature of the price of SVMs in terms of significant criteria such as robustness cost, opportunity cost, uncertainty budget, and execution time.

Keywords Cloud computing market, bidding strategy, price uncertainty, information gap decision theory (IGDT).

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