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学位の種類	博士（学術）
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学位論文題目	Reinforcement Learning aided Optimal Resource Allocation Mechanism for Open Markets （オープンマーケットの最適資源割当メカニズムを実現する強化学習に関する研究）
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論文内容の要旨

Resource allocation problems are widely studied problems for various market settings, not limited to cloud computing platforms, e-commerce business, supply-chains, warehouses, government procurement, etc. In such a business setting, resource allocation is challenging mainly because of the conflicting objectives of the consumer and the owner of their sources. In specific, resource owners aim at maximizing their revenue, and consumers aim at minimizing their expenditure. Considering the perspectives of both the participants increases the complexity of the resource allocation problem in real-world market settings. In this context, there is a need for an intermediator, which would negotiate on behalf of either of the participants or both. In specific, the intermediator acts as a broker, which builds consensus among the participants and maximizes the holistic social welfare of the business setting. In the literature, resource allocation problems are widely studied, specifically for the cloud computing domain. All the existing approaches focused on designing an optimal intermediator so that it maximizes social welfare. However, most of the intermediator in the existing approach does not address the dynamically changing supply-demand in the real-world business environment. Besides. it fails to incorporate cooperative behaviour among the participants in such a competitive market setting.

This research focuses on designing a learning-based intermediator (broker) for optimal resource allocation in a competitive business environment. Specifically, we aim to explore and customize reinforcement learning algorithms to address the challenges associated with resource allocation. Alongside, we propose different objectives depending on the perspectives of the participants, so that all the participants are equally motivated to participate in these custom designed allocation algorithms. This chapter will introduce the research area and motivation with a brief context of the resource allocation domain, followed by the existing research background, the research objectives which would also put forward the aims and critical questions being addressed, and finally, the limitations of this research are discussed.

論文審査結果の要旨

Resource allocation problems are widely studied problems for various market settings, not limited to cloud computing platforms, e-commerce business, supply-chains, warehouses, government procurement, etc. In such a business setting, resource allocation is challenging mainly because of the conflicting objectives of the consumer and the owner of their sources. In specific, resource owners aim at maximizing their revenue, and consumers aim at minimizing their expenditure. Considering the perspectives of both the participants increases the complexity of the resource allocation problem in real-world market settings. In this context, there is a need for an intermediator, which would negotiate on behalf of either of the participants or both. In specific, the intermediator acts as a broker, which builds consensus among the participants and maximizes the holistic social welfare of the business setting. In the literature, resource allocation problems are widely studied, specifically for the cloud computing domain. All the existing approaches focused on designing an optimal intermediator so that it maximizes social welfare. However, most of the intermediator in the existing approach does not address the dynamically changing supply-demand in the real-world business environment. Besides. it fails to incorporate cooperative behaviour among the participants in such a competitive market setting.

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We have judged this thesis to be sufficiently substantial to merit the award of the doctoral degree, and have judged the results of the examination to be acceptable.