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# Bi-level Programming Optimization Method for Cloud Manufacturing Service Composition based on Harmony Search

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## Highlights

- To solve the problem, research wireless-optical network model firstly and design new multi-objective model to consider network delay and energy consumption simultaneously, and because magnitude order of 2 indexes is different, single object optimization method is not applicable.
- Multi-objective water droplet algorithm is utilized to gain its second-best solution, and to improve performance of multi-objective water droplet algorithm simultaneously, improve population diversity of multi-objective intelligent water droplet algorithm by referring to NSGA II density design method and designing quick sorting method on the basis of individual density.
- Simulation result shows that performance of multi-objective intelligent water droplet algorithm is improved obviously through density design and multi-objective optimization to mobile cloud service of wireless-optical network is realized.

**Abstract.** Mobile computing diffidence has become critical technology to break out inherent processing capacity and memory limitation of mobile terminal equipment. Existing mobile cloud computing solution is to gain relatively little delay by visiting adjacent cloud service data center with abundant resources through mobile equipment, but it will increase network energy consumption. To solve the problem, research wireless-optical network model firstly and design new multi-objective model to consider network delay and energy consumption simultaneously, and

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