Supplementary file of "Joint Service Caching and Task Allocation in Digital Twin-Enabled Mobile Edge Computing Systems: A Bilevel Optimization Approach"

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I. Supplementary Tables

TABLE A. 1
ALGORITHM SETTINGS.

	Parameters	Common Parameters
BiSCTA	N=5, c=1.49, β=20, W_{max}=0.9, W_{min}=0.5	Population Size=100, Iteration=200, Runtimes=20
GA, BiGA	CR=0.8, MR=0.05	
PSO, BiPSO	$c1$=2.0, $c2$=2.0, W_{max}=0.9, W_{min}=0.5	
CSO, BiCSO	θ=0.1	

II. Supplementary Experiments

A. Performance Comparisons with Other Methods

To further validate the performance of our proposed BiSCTA, several state-of-the-art algorithms are also implemented, including SCTOA [1], NSGAIII-ASF&WD [2], and TOCC [3]. Specifically, SCTOA is a heuristic design [1], where service caching decisions are done through the Least Recent Used (LRU) algorithm [4] and each task selects the most economical decision for offloading. Moreover, NSGAIII-ASF&WD and TOCC are two advanced meta-heuristic algorithms proven to be efficient in solving the joint service caching and task allocation problem, as shown in [2] and [3]. NSGAIII-ASF&WD is a non-dominated sorting genetic algorithm that employs an achievement scalar function and a k-nearest neighbor weighted distance-based mating selection strategy. Meanwhile, TOCC is a multi-objective evolutionary algorithm developed under the decomposition framework (MOEA/D) via the Tchebycheff weight aggregation method [5]. Note that the parameters of all comparison algorithms can be found in the original works [1]–[3]. All comparison algorithms are run independently 20 times and the average results are recorded. The performance comparison results are shown in Fig. A. 1.

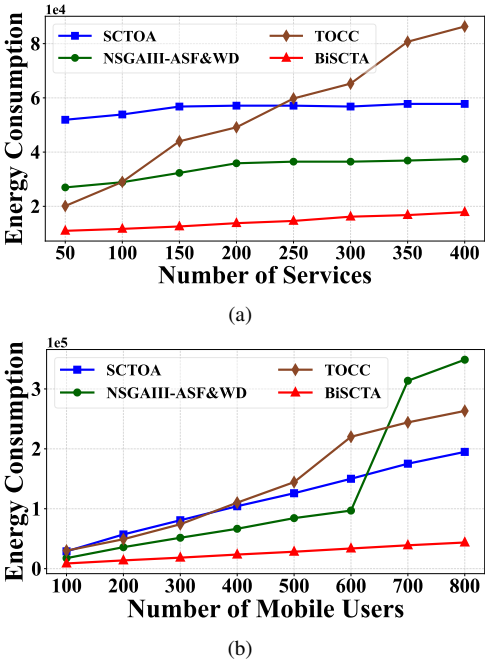

Fig. A. 1. Experimental results of BiSCTA compared to peer algorithms.

References

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