
# Fog computing task scheduling

a multi-objective AI-based approach

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## Abstract

[1]

## Introduction

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## Related Work

There are many existing studies and researches on the topics task scheduling, energy efficiency and AI in the context of fog computing. The concept of fog computing was introduced by Cisco in 2012 [1], and since then, many researches have been conducted to improve the performance of fog computing systems and reduce their environmental impact.

### Fog computing

Fog computing is a paradigm that extends cloud computing and services to the edge of the network. [2] and [3] respectively investigate the concepts surrounding fog and its applications in the context of IoT. [4] offers an extensive review of the existing work on fog computing.

### Task Scheduling in Fog Computing

The task scheduling problem in fog computing has been widely studied in the literature. Many researchers have proposed different algorithms and techniques to optimize the task scheduling process in fog computing systems. [5] offers an analysis of the existing algorithms while identifying the challenges and research gaps. In [6], the authors propose a task scheduling algorithm based on Swarm Intelligence and Machine Learning. This hybrid approach minimizes the execution time and the makespan and improves the performance of the load balancing scheduling. In [7], an optimization model is proposed for the problem of mapping data stream over fog nodes while considering the load of those nodes and the latency between the sensors and the nodes. A heuristic based on genetic algorithms is then presented to address the complexity of the problem. In [8], the authors propose a task clustering and scheduling mechanism based on Differential Evolution to find the optimal execution time for the tasks. The mechanism is compared to the Firefly Algorithm and Particle Swarm Optimization, and the results show that the proposed mechanism outperforms the other two algorithms in terms of execution time, system efficiency and stability.

### Energy Efficiency in Fog Computing

The energy efficiency of fog computing systems has been a major concern for researchers. [9] introduces a mathematical framework to evaluate the trade-off of fog computing systems, especially in terms of power consumption and energy efficiency. In [10], the authors propose two Integer Linear Programming models, where the second one aims at minimizing the energy consumption while maximizing successfully provisioned tasks. The authors of [11] provides an overview of the energy efficiency challenges in fog computing and presents a comprehensive survey of the existing energy-efficient techniques and algorithms. An energy-aware Metaheuristic algorithm based on the Harris Hawks Optimization algorithm, itself based on a local search strategy for task scheduling in fog computing, is proposed in [12]. [13] proposes an energy efficient algorithm through an integrated computation model.

### Metaheuristics in Fog Computing

Different metaheuristic algorithms have been proposed to solve the task scheduling problem in fog computing. In [14], the authors propose an approach based on Fuzzy Logic for real-time task scheduling in IoT applications.

### AI in Fog Computing

The use of AI in fog computing has been a growing trend in the literature. An efficient binary CNN with numerous skip connections is proposed by the authors of [15]. In [16], the authors designed an intelligent energy-saving model based on CNN and a task scheduling model is designed based on the policy gradient algorithm. [17] present an improved convolutional neural network so solve the value function of a Continuous Markov Decision Process model, so it can be applied to a multi-user system.

## Travail réalisé

Réalisation

## Conclusion

Conclusion

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