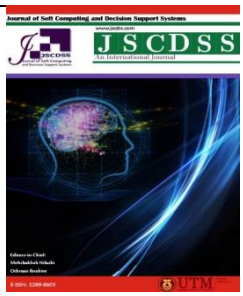
An International Journal
JSCDSS
http://www.jscdss.com
Vol.8 No.4 August 2021: 6-10
Article history:
Accepted 30 July 2021
Published online 30 July 2021

Journal of Soft Computing and Decision Support Systems



E-ISSN: 2289-8603

An Efficient Algorithm for Optimization of Service Locating in Fog Computing Architectures

Tofigh Asbaghi [a,*], Mohsen Tarighi [a], Mohsen Bagheri Zefrei [a]
[a] Amirkabir University of Technology, Department of Computer Engineering, Tehran, Iran

*** Corresponding author email address**: tofiq@aut.ac.ir

Abstract

In this paper, the optimizing of Fog computing service quality is addressed regarding the service locating using proposing an efficient algorithm. The cost, response time, and reliability parameters are used in the optimization process through three categories, sequential, conditional, and parallel. The multi-criteria decision-making process of this paper is performed by the multi-objective optimization programming method. The algorithm consists of Fog service selection based on the quality evaluation. Then, the cloud management system interacts with Fog nodes using cloud providers to improve the quality and priority of services that are chosen for a specific user request.

Keywords: Smart City, Cloud Computing, Fog Computing, Edge Computing, Big Data Analysis

1. Introduction

One of the most important technologies of data science is cloud computing (Asadi, Nilashi, & Yadegaridehkordi, 2017; Mohammed, Ibrahim, Nilashi, & Alzurqa, 2017; Wang et al., 2010; Yadegaridehkordi, Nilashi, Shuib, & Samad, 2020; Yadegaridehkordi, Shuib, Nilashi, & Asadi, 2019). On the other hand, as the drastic rising wave of Internet deployments, Internet of Things (IoTs) calls for mobility support and places extensive focus on service latency (Ahmadi et al., 2019; Khaneghah, Nezhad, Mirtaheri, Sharifi, & Shirpour, 2011; Yadegaridehkordi, Nilashi, Shuib, Asadi, & Ibrahim, 2019). Therefore, with this incredible data transfer demand that a new generation of IoT systems and components are imposing on the overall network, the cloud computing revolution in science and technology is somehow miraculous. It has made real-time availability of various scalable software program sources feasible over the internet. Although it has some exceptional benefits like low cost, or fast computing process, there are a few obstacles that occasionally limit the usability of cloud computing. On the other hand, there is another computing methodology which is a futuristic model of the cloud, that is Fog Computing. In fact, it is a promising solution for IoTs using Cloud Computing extension near or beyond the threshold of the Internet. But the appropriate fog computing nodes set-up and proper decisions with regards to node scales is a first-rate project of Fog Computing structures (Mirtaheri et al., 2013).

Fog computing offers real-time transportation solutions for customers in the vicinity of their close neighborhood. Moreover, fog computing will contribute to Autonomous Driving as well (Wu, Zhang, Guan, Wolter, & Xu, 2020).
Although the interaction between IoT and Fog is investigated among scholars, the number of works focusing on Fog node locating is not ample. Because of this, (Kirimtat, Krejcar, Kertesz, & Tasgetiren, 2020). has analyzed the scaling of Fog nodes using a Mixed-Integer Linear Programming (MILP) to accomplish an appropriately- dimensioned Fog system.
Since service locating of the Fog architectures are a multi-criteria decision-making process, in this paper to improve the optimization process concerning design parameters (cost, response time, and reliability) multi-objective optimization programming method is employed considering three different categories, sequential, conditional, and parallel. In the following sections, the concept, as well as advantages of the Fog in comparison to cloud computing, is investigated, then, an efficient algorithm based on multi-objective optimization formulation is proposed (Linthicum, 2017).

2. Related Works

Brought about explosive growth, high excellence Cell packages emerged as a crucial aspect of human life while smartphones are turning into regular companions anywhere. This causes the advent of Fog computing as a persuasive, realistic, and environment-friendly alternative