Multi-Objective Optimization of Fog-based Remote Healthcare Monitoring System for Covid-19 Patients

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With the advent of technology, the healthcare industry has grown increasingly technologically interconnected. Modern technology can rapidly and accurately process millions of health records of patients compared to the traditional systems. With the advancement of the Internet of Things related to the healthcare sector, it has become possible to gather patients' data from multiple geographical locations. To manage those data, cloud computing-based data management solutions have been introduced. However, such solutions face various challenges due to aspects such as latency, energy consumption, large data volumes, context-awareness, etc. As a result, the probability of processing and transmission errors has increased. To overcome those challenges, Fog Computing was introduced as an alternative to lessen the complexity of health data management. Even though the fog-based healthcare systems address many problems associated with cloud-based systems, the Quality of Service enhancement of fog computing remains a challenge. This study presents an effective architecture for a fog-based remote healthcare monitoring system for COVID-19 patients. The proposed architecture consists of 3 main layers; sensor layer, fog layer, and cloud layer and it has a visualization and alarm sub-layer which consists of a web application and an alarm system. The proposed system was evaluated using the iFogSim toolkit in terms of latency and energy consumption. The results were compared with those of a cloud-based system and it was discovered that the proposed system outperforms the cloud-based system.

Keywords: Fog Computing, QoS, Healthcare, Fog-Based Healthcare