

Accepted Manuscript

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PII: S0263-2241(18)30022-8
DOI: <https://doi.org/10.1016/j.measurement.2018.01.022>
Reference: MEASUR 5197

To appear in: *Measurement*

Received Date: 1 July 2017
Revised Date: 22 December 2017
Accepted Date: 15 January 2018

Please cite this article as: A. Abdelaziz, M. Elhoseny, A.S. Salama, A.M. Riad, A Machine Learning Model for Improving Healthcare services on Cloud Computing Environment, *Measurement* (2018), doi: <https://doi.org/10.1016/j.measurement.2018.01.022>

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A Machine Learning Model for Improving Healthcare services on Cloud Computing Environment

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Abstract

Recently, cloud computing gained an important role in healthcare services (HCS) due to its ability to improve the HCS performance. However, the optimal selection of virtual machines (VMs) to process a medical request represents a big challenge. Optimal selection of VMs performs a significant enhancement of the performance through reducing the execution time of medical requests (tasks) coming from stakeholders (patients, doctors, etc.) and maximizing utilization of cloud resources. For that, this paper proposes a new model for HCS based on cloud environment using Parallel Particle Swarm Optimization (PPSO) to optimize the VMs selection. In addition, a new model for chronic kidney disease (CKD) diagnosis and prediction is proposed to measure the performance of our VMs model. The prediction model of CKD is implemented using two consecutive techniques, which are linear regression (LR) and neural network (NN). LR is used to determine critical factors that influence on CKD. NN is used to predict of CKD. The results show that, the proposed model outperforms the state-of-the art models in total execution time the rate of 50%. In addition, the system efficiency regarding real-time data retrieval is greatly improved by 5.2%. In addition, the accuracy of hybrid intelligent model in predicting of CKD is 97.8%. The proposed model is superior to most of the referred models in the related works by 64%.

Keywords: Cloud Computing, Health Services, Parallel Particle Swarm Optimization, Linear Regression, Neural Network, Chronic Kidney Disease

1. Introduction

In recent years, cloud computing gained a great attention in HCS applications due to its ability to provide different medical services over the internet. Cloud computing allows applications to provide infrastructure services to big numbers of stakeholders with assorted and dynamically changing requirements [1]. Technically, cloud is composed of datacentres, hosts, VMs, resources, etc. Datacentres are containing a big number of resources and list of different applications. Hosts are composed of several VMs to store and regain several medical resources to stakeholders. Cloud computing uses the virtualization technique which permits to share a single physical instance of a resource or an application among various stakeholders and enterprises [2]. It does this by allocating a logical name to a physical storage and providing a pointer to that physical resource when requested.

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