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A Context-sensitive offloading system using machine-learning classification algorithms for mobile cloud environment

Warley Junior[a,*], Eduardo Oliveira[a], Albertinin Santos[a], Kelvin Dias[a,*]

[a]*Informatics Center, Federal University of Pernambuco, Road Jorn. Anibal Fernandes, Cidade Universitaria, Recife, PE 50740-560, Brazil*

Abstract

Computational offloading in Mobile Cloud Computing (MCC) has attracted attention due to benefits in energy saving and improved mobile application performance. Nevertheless, this technique underperforms if the offloading decision ignores contextual information. While recent studies have highlighted the use of contextual information to improve the computational offloading decision, there still remain challenges regarding the dynamic nature of the MCC environment. Most solutions design a single reasoner for the offloading decision and do not know how accurate and precise this technique is, so that when applied in real-world environments it can contribute to inaccurate decisions and consequently the low performance of the overall system. Thus, this paper proposes a Context-Sensitive Offloading System (CSOS) that takes advantage of the main machine-learning reasoning techniques and robust profiling system to provide offloading decisions with high levels of accuracy. We first evaluate the main classification algorithms under our database and the results show that JRIP and J48 classifiers achieves 95% accuracy. Secondly, we develop and evaluate our system under controlled and real scenarios, where context information changes from one experiment to another. Under these conditions, CSOS makes correct decisions as well as ensuring performance gains and energy efficiency.

Keywords: Mobile cloud, context-sensitive, machine-learning, classification algorithms.

1. Introduction

The synergy of three heterogeneous cornerstone technologies - namely mobile computing, cloud computing, and networking - has allowed great advances to be made in the way mobile devices access and process their services. Mobile cloud computing (MCC) is a result of such progress since it provides cloud computing services on a mobile ecosystem. MCC enables computation and storage migration from resource-poor mobile device to cloud servers, enhancing service availability, speed, and reliability. Moreover, it may reduce the

*Corresponding author

Email addresses: wmvj@cin.ufpe.br (Warley Junior), ehammo@cin.ufpe.br (Eduardo Oliveira), ams11@cin.ufpe.br (Albertinin Santos), kld@cin.ufpe.br (Kelvin Dias)

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