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An experimental case study on the relationship between workload and resource consumption in a commercial web server

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Highlights

- We give an experimental case study on the relationship between workload and resource consumption in a commercial web server.
- The proposed method gives a way to tune the commercial web server in order to reduce the loss by software aging problems.
- The proposed guide can predict resource consumption efficiently.
- The submitted paper is an original paper and not submitted to other journals.

Abstract

Since software aging has been proposed for decades, resource consumption parameters and performance parameters have been used to identify whether running a commercial web server has been in aging state or failure state. However, the relationship between workload parameters and resource consumption parameters has not been analyzed and also sensitivity between resource consumption parameters and workload parameters has not been studied before. In this work, we give an experimental case study about resource consumption parameters and workload parameters in an Internet Information Services. Firstly, we use fitted resource consumption parameter to learn the relationship between workload parameters and resource consumption parameters through visual observation and calculation. Secondly, sensitivity analysis is used to find how resource consumption parameter changes when deleting one workload parameter at a time. Thirdly, the regression tree based on a risk estimate is used to forecast resource consumption. In the experiments, we see that almost all the parameters present nonlinear feature through visual observation. And we find that some workload parameters are redundant for fitting resource parameters by using sensitivity analysis. Our proposed regression tree is better than artificial neural network by using mean absolute error.

Keywords: software aging; pearson's correlation coefficient; sensitivity analysis; commercial web server; resource consumption

1. Introduction

There is the message that business receipts are influenced by up to 9% of overall business revenues because of software application performance problems [1]. 32% of consumers will abandon Web sites, which are accessed slowly. Based on the analysis of end-users' acceptance of Enterprise Resource Planning systems, Nah et al. [2] pointed out that beliefs about the systems played a key role on the acceptance of Enterprise Resource Planning systems.

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