Chapter 15
Software Performance Estimate using Fuzzy Based Backpropagation Learning

Khaleel Ahmad
Maulana Azad National Urdu University, India

Abdul Wahid
Maulana Azad National Urdu University, India

Gaurav Kumar
Swami Vivekananda Subharti University, India

Mudasir M. Kirmani
Maulana Azad National Urdu University, India

ABSTRACT

Accurate estimation of the software performance and its reliability is an important task in designing, developing and implementing software as per the desired requirements. With the increase in individuals relying on software application in their daily lives has resulted in increase in demand for good quality software with efficient performance. The professionals in the software industry are facing an uphill task of developing software with efficient performance measure and at the same time capable of evaluating software performance. In order to evaluate software performance it is necessary to have a method to estimate the software performance. The estimation of software performance plays an important role in predicting acceptability and longevity of a software product. Software performance estimation is essential in existing software-dominated environment where part of daily life is directly or indirectly dependent on software for fulfilling requirements. In this chapter discusses the reasons underlying the proposals and shows the pitfalls associated to these software attributes.

INTRODUCTION

With the rapid development of computer technology, it is becoming increasingly important in everyday activity of an individual resulting in increase of dependability on computer technology. Therefore, every individual uses a software application based on the different parameters with performance being of high priority. An individual starts relying on software based on the performance which makes it very important from user's perspective. Software performance prediction modeling techniques are the basis of quantitative analysis of software and have caught the focus of software developers. It has becomes more difficult to conduct quantitative and qualitative performance prediction and analysis for software

DOI: 10.4018/978-1-5225-0159-6.ch015

systems because of the increasing scale and complex structures and behaviors. However, fuzzy and backpropagation learning techniques are of great help in dealing with this issue (Takacs, 2004) (Sram & Takacs, 2011) (Mitra & Hayashi, 2000). The determination of software performance indices is the crucial task for software engineers across the globe. The quality indices are not only the basis for the software performance design and the constraints during the software development cycle (Piattini, M., M., Jiménez & L, 2001). Software performance is usually separated into quantitative and qualitative index. Quantitative index is quantified software performance parameter values, such as reliability of software are defined as the likelihood of breakdown free operation of a software program for a specific time based on certain conditions (Hsu & Huang, 2011). Most of the research in software components is devoted to specification, design, reuse, and cataloguing of the components. Software reliability and performance is defined as the probability of the failure free operation of a software system for a specified period of time in a specified environment (Bontempi & Kruijtzer, 2002) ("Software engineering fundamentals," 1996). With the increase in complexity of software applications more emphasis is given on reusability and function library management (Jakubek & Strasser, 2004).

Software application performance is defined as follows:

- The likelihood of a given system performing its task adequately for a particular period of instance under the accepted operating conditions.
- The likelihood that software will provide breakdown-free function in a preset environment for a predetermined interval of time.

Software performance is normally deliberate per unit of time, whereas likelihood of breakdown is generally time independent. Software performance differs considerably from program correctness which paves way to independent effort estimation method for software performance. Fuzzy theory provides the desired result in estimating the software attributes regarding its technical or non-technical attributes (Shi & Mizumoto, 2000) (Yang, Xu & Zang, 2000) (P, Liu, Hongxing & L, 2004) (Kuo, J, Wu, P, Wang & P, 2002).

The distinction between software and other engineering artefacts is that software is pure design. Design errors due to human-mistake leads to the development of software which is not reliable. Therefore, the need of the hour is to develop a method which can estimate the software performance where software reliability is one the important driving factor. To determine software performance indices research has already been carried in software reliability engineering, which is the base for the further research in the domain. The area of software performance with all life cycle actions that prevents, notice, eliminate, mitigate software faults and that verify the scale to which software faults will be fixed without causing system failures. The current state of research is focused on reliability qualitative indices. However, in some cases researchers find it difficult to describe reliability requirements quantitatively. Based on the process control perspective, the relevant qualitative indices of software performance are put forward in the process of software development. When these indices are met, there is much higher level of confidence which results in assurance of software performance. Software performance can be expressed by qualitative description, such as requests for exception handling and degrading handling. In practice management parameters are used to describe performance activities in each stage of software development from inception till its maturity. This indicates that software performance qualitative indices should be put forward as a substitute to quantitative indices but it is difficult to find a systematic method at present related to the domain.