ABSTRACT

This paper discusses the Bayesian approach to estimation and prediction of the reliability of software systems during the testing process. A Non-Homogeneous Poisson Process (NHPP) arising from the Musa-Okumoto (1984) software reliability model is proposed for the software failures. The Musa-Okumoto NHPP reliability model consists of two components—the execution time component and the calendar time component, and is a popular model in software reliability analysis. The predictive analyses of software reliability model are of great importance for modifying, debugging and determining when to terminate software development testing process. However, Bayesian and Classical predictive analyses on the Musa-Okumoto (1984) NHPP model is missing on the literature. This paper addresses four software reliability issues in single-sample prediction associated closely with development testing program. Bayesian approach based on non-informative prior was adopted to develop explicit solutions to these problems. Examples based on both real and simulated data are presented to illustrate the developed theoretical prediction results.

Keywords

Non-Informative Priors, Non-Homogeneous Poisson Process, Bayesian Approach, Intensity Function, Software Reliability Model