On Allocation of Resources during Testing and Debugging Phase using Flexible SRGM: A Genetic Algorithm Approach

Vijay Kumar[a*], H.D. Arora [b], Naman Taneja [c] and Ramita Sahni [b]

[a] *Department of Mathematics, Amity School of Engineering & Technology,*
New Delhi-110061
Corresponding Author Email: vijay_parashar@yahoo.com (Corresponding Author)
[b] *Department of Mathematics, Amity Institute of Applied Sciences,*
Amity University, Noida (U.P)
Email: hdarora@amity.edu; smiles_ramita@yahoo.co.in
[c] *Department of Mechanical and Automation Engineering,*
Amity School of Engineering & Technology, New Delhi-110061
Email: namantaneja1993@gmail.com

Abstract:

This paper investigates the optimal resource allocation plan using flexible software reliability growth model with the objective to minimize the cost of software and maximize the reliability during the testing phase under dynamic conditions. Developing reliable software is one of the most difficult problems faced by the software industry. Successful measurement of software reliability and maximizing the fault detection in the testing and debugging phase can contribute substantially to long term financial success and developer goodwill. Many software reliability growth models have been proposed in the last four decade to minimize the total testing effort expenditures, but mostly under static assumption. An elaborate optimization policy based on the optimal control theory and genetic algorithm is proposed and numerical examples are illustrated. This article also studies the optimal resource allocation problem for various conditions by examining the behaviour of the model parameters and also suggests policy for the optimal release time of the software. The experimental results greatly help us to identify the contribution of each selected parameter and its weight.

Keywords: Flexible SRGM, Genetic Algorithm, Testing effort allocation, Optimal Control Theory, Release time problem, Experience curve effect.