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Optimization and Automation of Functional Testing with White-Box Testing Method

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Abstract : In order to be more efficient in industries that are related to computer systems, software testing is necessary despite spending time and money. In the embedded system software test, complete knowledge of the embedded system architecture is necessary to avoid significant costs and damages. Software tests increase the price of the final product. The aim of this article is to provide a method to reduce time and cost in tests based on program structure. First, a complete review of eleven white box test methods based on ISO/IEC/IEEE 29119 2015 and 2021 versions has been done. The proposed algorithm is designed using two versions of the 29119 standards, and some white-box testing methods that are expensive or have little coverage have been removed. On each of the functions, white box test methods were applied according to the 29119 standard and then the proposed algorithm was implemented on the functions. To speed up the implementation of the proposed method, the Unity framework has been used with some changes. Unity framework can be used in embedded software testing due to its open source and ability to implement white box test methods. The test items obtained from these two approaches were evaluated using a mathematical ratio, which in various software mining reduced between 50% and 80% of the test cost and reached the desired result with the minimum number of test items.

Keywords : embedded software, reduce costs, software testing, white-box testing
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