ENHANCEMENT OF TESTING TECHNIQUE FOR SOFTWARE PRODUCT LINE BY USING BAT AND GENETIC ALGORITHM

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A dissertation submitted in partial fulfillment of
the requirements for the award of the degree of
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ABSTRACT

Software Product Line (SPL) is the new method to share the software product assets to build a new product that contains variety set of features. The important aspect in SPL is to test the variability of the features. This can lead to an exhaustive testing process. Thus, the combinatorial testing is seen as an effective approach to reduce the number of product to be tested especially for huge number of features. The aim of this research is to establish an enhanced testing algorithm for minimizing the number of test cases for SPL in order to avoid an exhaustive testing. The objective had been achieved by the enhancement of testing algorithm by combining BAT and Genetic Algorithm. The results have been evaluated by using test coverage criteria, number of test cases generated and benchmark function to measure the effectiveness of the algorithm. From the evaluation, this enhancement had increase the test coverage by 20% as compared to the original BAT algorithm. Thus, performance shows lower processing for the enhanced BAT. Furthermore, the numbers of test cases generated is more accurate which is the generation meet one stable point and generate consistent number of test cases. The enhanced BAT algorithms show higher coverage and minimize the number of test cases from 164 to 9.

ABSTRAK

Perisian Barisan Produk merupakan satu kaedah untuk membangunkan sistem berteraskan perkongsian ciri-ciri daripada sistem sedia ada. Antara aspek yang penting dalam barisan produk perisian adalah pengujian berdasarkan kepelbagaiaan ciri-ciri yang menyebabkan pengujian secara individu tidak bersesuaian kerana ianya boleh menyebabkan pengujian yang berpanjangan. Justeru itu, pengujian kombinasi dilihat sebagai kaeadah yang efektif untuk mengurangkan jumlah produk untuk diuji terutamanya untuk produk yang mempunyai ciri-ciri yang pelbagai. Selain itu, ujian Kombinasi menghasilkan kes ujian yang meliputi semua kebarangkalian ciri-ciri t. Tambahan pula, ia lebih focus kepada mencapai liputan menyeluruh kombinasi ciri-ciri yang menghasilkan nombor yang minima untuk kes pengujian. Tujuan kajian ini adalah untuk mewujudkan satu penambah baikan algoritma untuk mengurangkan nombor kes pengujian bsgi produk untuk diuji. Objektif ini dicapai dengan mewujudkan penambah baikan algoritma dengan menggabungkan algoritma kelawar dan algoritma genetik. Keputusan kajian dinilai menggunakan peratusan liputan, nombor pengujian yang dijana dan fungsi penanda aras standard bag mengukur keberkesanan algoritma ini. Hasil kajian menunjukkan peningkatan sebanyak 20% dari segi liputan berbanding algoritma kelawar yang asal. Selain itu, nombor kes pengujian yang dijana lebih tepat di mana semasa proses penjaan, ia akan mencapai satu titik stabil yang menghasilkan nombor kes pengujian yang sekata. Keputusan penambah baikan algoritma kelawar menunjukkan peratusan liputan yang lebih tinggi dan minimum nombor kes pengujian daripada 164 kepada 9.

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