ARAB ACADEMY FOR SCIENCE, TECHNOLOGY AND MARITIME TRANSPORT

College of Computing and Information Technology

Information Systems Department

SOFTWARE TESTING SUITE PRIORITIZATION USING MULTI-CRITERIA FITNESS FUNCTION

By:

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In:

INFORMATION SYSTEMS

Supervised by:

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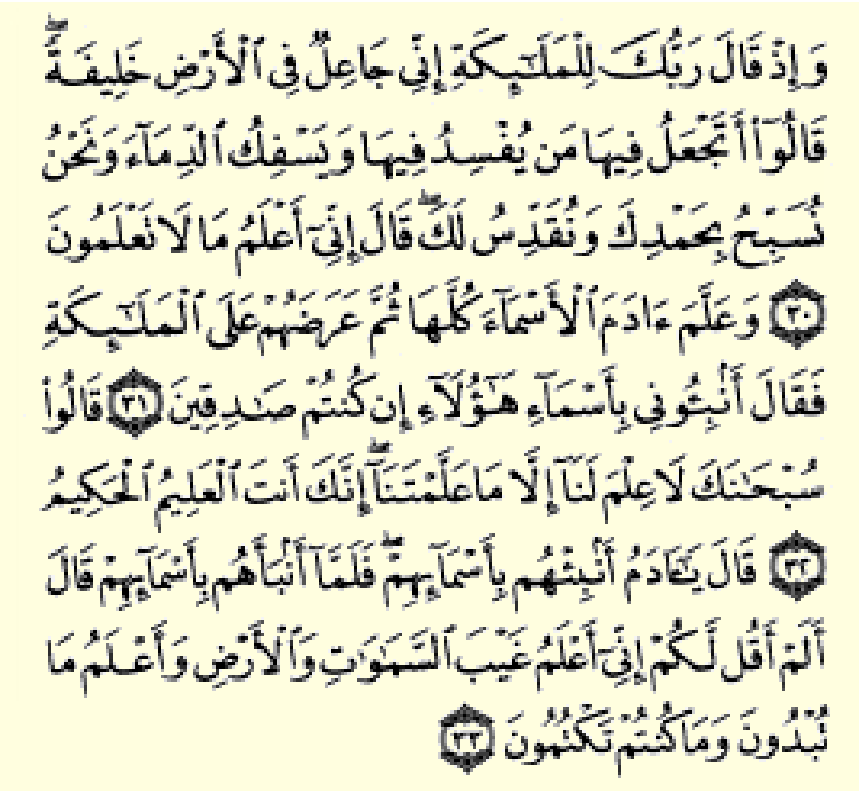
بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ


وَإِذْ قَالَ رَبُّكَ لِلْمَلَٰٓئِكَةِ إِنِّي جَاعِلٌ فِي ٱلْأَرْضِ خَلِيفَةً
قَالُوٓا۟ أَتَجْعَلُ فِيهَا مَن يُفْسِدُ فِيهَا وَيَسْفِكُ ٱلدِّمَآءَ وَنَحْنُ
نُسَبِّحُ بِحَمْدِكَ وَنُقَدِّسُ لَكَ ۖ قَالَ إِنِّيٓ أَعْلَمُ مَا لَا تَعْلَمُونَ
٣٠ وَعَلَّمَ ءَادَمَ ٱلْأَسْمَآءَ كُلَّهَا ثُمَّ عَرَضَهُمْ عَلَى ٱلْمَلَٰٓئِكَةِ
فَقَالَ أَنۢبِـُٔونِى بِأَسْمَآءِ هَٰٓؤُلَآءِ إِن كُنتُمْ صَٰدِقِينَ ٣١ قَالُوا۟
سُبْحَٰنَكَ لَا عِلْمَ لَنَآ إِلَّا مَا عَلَّمْتَنَآ ۖ إِنَّكَ أَنتَ ٱلْعَلِيمُ ٱلْحَكِيمُ
٣٢ قَالَ يَٰٓـَٔادَمُ أَنۢبِئْهُم بِأَسْمَآئِهِمْ ۖ فَلَمَّآ أَنۢبَأَهُم بِأَسْمَآئِهِمْ قَالَ
أَلَمْ أَقُل لَّكُمْ إِنِّيٓ أَعْلَمُ غَيْبَ ٱلسَّمَٰوَٰتِ وَٱلْأَرْضِ وَأَعْلَمُ مَا
تُبْدُونَ وَمَا كُنتُمْ تَكْتُمُونَ ٣٣

الأيات من 30 الى 33 من سورة البقرة

DEDICATION

To my Father

To my Mother

To my family

To my teachers

To my colleagues

To everyone seeking truth

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By the Name of Allah, the Most Gracious and the Most Merciful

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Abstract

Regression testing is the process of validating modifications introduced in a system during software maintenance. It is an expensive, yet an important process. As the test suite size is very large, system retesting consumes large amount of time and computing resources. Unfortunately, there may be insufficient resources to allow for the re–execution of all test cases during regression testing. Testcase prioritization techniques aim to improve the effectiveness of regression testing, by ordering the test cases so that the most beneficial are executed first with higher priority. The objective of test case prioritization is to detect faults as early as possible. An approach for automating the test case prioritization process using genetic algorithm with Multi-Criteria fitness function is presented. It uses multiple control flow coverage metrics. These metrics measure the degree of coverage of conditions, multiple conditions, and statements that the test case covers. Theses metrics are weighted by the number of faults revealed and their severity. The proposed Multi-criteria technique uses more coverage items compared to the other related work.

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Nomenclatures

Symbol	Nomenclatures
APFD	Average Percentage Of Fault Detected
CC	Condition Coverage
CFG	Control Flow Graph
CN	Cyclomatic Number
DFS	Depth First Search
F(x)	Fitness Function
FI	Fault Impact
GA	Genetic Algorithm
IDE	Integrated Development Environment
Max(s)	Maximum Severity Among All Test Cases
MCC	Multiple Condition Coverage
O	Order
RFT	Rate Of Fault
S	Severity Of Test Case
SC	Statement Coverage
SV	Severity Of Fault
TCW	Test Case Weight
V(G)	Cyclomatic Complexity