A Major Project Report On

BIOGEOGRAPHY BASED OPTIMIZATION FOR COMPLEX SYSTEM

Submitted in partial fulfilment of the requirements

For the award of the degree of

MASTER OF TECHNOLOGY

IN

SOFTWARE ENGINEERING

By

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DELHI TECHNOLOGICAL UNIVERSITY

CERTIFICATE

This is to certify that the project report entitled **BIOGEOGRAPHY BASED OPTIMIZATION FOR COMPLEX SYSTEM** is a bonafide record of work carried out by **Manas Gaur** (2K13/SWE/07) under my guidance and supervision, during the academic session 2013-2015 in partial fulfilment of the requirement for the degree of Master of Technology in Software Engineering from Delhi Technological University, Delhi.

To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/Institute for the award of any Degree or Diploma.

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ABSTRACT

Test Suite optimization is category of concern when it comes to reducing the time consumption during the testing process. During the software development life cycle, errors are tend to be noticed during the maintenance phase, for which regression testing is employed. For regression testing activity to be carried out in productive manner, it is crucial to select appropriate set of test cases that provide complete coverage and reducing time consumption during testing phase. Earlier work on test suite optimization employed various heuristic algorithms, Greedy algorithms and simulated annealing approach. A common drawback of these algorithm is that all are based on some gradient functions and are sensitive to differentiability and discontinuity in the problem domain. In order to improve the efficacy of test suite optimization process, we modified and tested a meta-heuristic algorithm, Bio-geography based optimization (BBO) to minimize, prioritize and select efficient test cases from test suite. The algorithm was low on resource utilization, execution time and complexity when compared with other nature inspired algorithms viz. Harmony Search, Ant Colony Optimization and Firefly, which have been used for test suite optimization (TSO). Since traditional statistical technique like support vector machine have been used in the domain of software testing, hence, we compare support vector machine with extended BBO, for test suite prioritization to show the efficiency of computational intelligence over supervised learning classifier. The results proved that BBO for TSO has reached the state of the art when applied on real time software data.

Keywords – Biogeography Based Optimization (BBO), Harmony Search (HS), Ant Colony Optimization (ACO), Firefly Algorithm, Simulated Annealing, Test Suite Optimization (TSO), Support Vector Machine (SVM).