IMPROVING PERFORMANCE OF GENETIC ALGORITHMS USING DIVERSE OFFSPRING AND DYNAMIC MUTATION RATE

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by

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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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07 February 2011

~~We~~/I endorse the declaration by the candidate.

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Prof. Lanka Udawatta

CONTENTS

Abstract

In this work a Genetic Algorithm coding and a required genetic operation library has been developed with some modifications by introducing dynamic mutation rates and fraction of diverse offspring to increase the searching probability. The improvement was done to the algorithm to automatically select the dynamic mutation rate and fraction of diverse offspring depending on the optimization problem.

The modified genetic algorithm with dynamic mutation and diverse offspring was tested with Sin, Step, Sphere and Rastrigin's benchmark functions. Same benchmark test was done with simple random search and conventional genetic algorithm to compare the performance. Also these results were compared with other researchers' results.

The results show that the genetic algorithm with Dynamic Mutation rates and diverse offspring has better searching performance than the conventional Genetic algorithm and the simple random work especially with high dimensional benchmark functions. It also shows that the risk of convergence to a false local optimum can be reduced by the introduction of diverse offspring to the population of next generation. It shows that the searching performance of a Genetic Algorithm can be significantly improved by increasing the diversity of the population using dynamic mutation rates and appropriate fraction of diverse offspring while conserving the convergence characteristics. Result shows the effectiveness of the proposed algorithm.

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