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Analysis Of Genetic Crossover Techniques Based On Roulette Wheel Selection Algorithm And Steady State Selection Algorithm

G.S.Geethamani[1], Dr M.Mayilvaganan[2]
[1]Research Scholar, PG and Research Department of Computer Science, Karpagam University, Coimbatore, Tamil Nadu, India.
Assistant Professor in PG Department of Information Technology,Hindusthan College of Arts and Sceience, Coimbatore, India.
e-mail: gsgeethamani @gmail.com
[2]Associate Professor in Department of Computer Science, PSG College Of Arts And Science,Coimbatore-641 028, Tamil Nadu, India

ABSTRACT: The basic idea behind this proposed method is to analyze the genetic cross over techniques using roulette wheel selection and steady state selection algorithm.

The proposed algorithm is applied to find the genetic operators which are termed as mutation, crossover and selection in large dataset. The proposed technique is very useful to analyse the impact of genetic crossover techniques in random population of chromosomes.

After estimating the genetic crossover technique, the efficiency of the roulette wheel and steady state selection algorithm are estimated. After estimating the efficiency of both algorithms, there is a need to compare the efficiency of roulette wheel and steady state selection algorithm based on the initial population. The extracted rules and analyzed results are graphically demonstrated. The performance is analyzed based on the different number of instances in large data set.

KEYWORDS : Genetic Algorithm, offspring, Mutation, Crossover, Chromosomes

INTRODUCTION

Adaptive heuristic search algorithms based on the evolutionary ideas of natural selection and natural genetics. They mimic the genetic processes of biological organisms. The population undergoes transformation using three primary genetic operators – selection, crossover and mutation which form new generation of population. The GA maintains a population of n chromosomes (solutions) with associated fitness values .Parents are selected to mate, on the basis of their fitness, producing offspring via a reproductive plan

The process of choosing the two parents for reproduction is characterized by the selection operator. The selection is based on the fitness of the individual. Higher the fitness, more the Chance of the individual being selected.

Crossover operator Crossover is the process of taking two parent solutions and producing from them a two new offspring. Crossover is a recombination operator that proceeds in three steps:

The reproduction operator selects at random a pair of two individual strings for the mating .A cross site is selected at random along the string length. Finally, the position values are swapped between the two strings following the cross site The process of choosing the two parents for reproduction is characterized by the selection operator. The selection is based on the fitness of the individual. Higher the fitness, more the chance of the individual being selected.

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LITERATURE SURVEY

Encoding techniques in genetic algorithms (GAs) are problem specific.It transforms the problem solution into chromosomes. Various encoding techniques used in genetic algorithms (GAs) are binary encoding, permutation encoding, value encoding and treen coding.

Selection is an important function in genetic algorithms (GAs), based on an evaluation criterion that returns a measurement of worth for any chromosome in the context of the problem.

The commonly used techniques for selection of chromosomes are Roulette wheel, rank selection and steady state selection In binary encoding, the chromosomes may crossover at single point two point, uniformly or arithmetically.

In single point crossover, a single crossover point is chosen and the data before this point are exactly copied from first parent and the data after this point are exactly copied from the second parent to create new off springs. Two parents in this method give two new off springs.

In uniform crossover, data of the first parent chromosome and second parent chromosome are randomly copied. In arithmetic crossover, crossover of chromosomes is performed by AND and OR operators to create new off springs

RESEARCH FRAME WORK DESIGN

The proposed Algorithm consists of following components.

1. Pubchem database - The dataset consists of 300 sequences,which serves as a training and testing set.

2. Collecting nucleotide genetic dataset - The data set used for the proposed work in DNA sequences is obtained from PubChem.

3. Data pre-processing -It involves selecting data from a data warehouse and pre-processing it, applying a data mining component to produce a structure, and then evaluating the derived structure. After pre-processing is completed, it can be transferred to data mining process.

4. Implementing Roulette wheel selection and steady state selection algorithm – The proposed work, genetic crossover techniques are applied to initial population of chromosomes in the gene sequence data.

5. Create a random population– Create the random population size of chromosomes.

6. Estimate the best fitness(Fbest) value- Estimate the best fitness value for each chromosomes in the population .

7. Create an intermediate population – Choose two parent chromosomes from a population using selection operator -

8. Create new off spring using crossover and mutation technique –
Generate the new offspring using genetic operator techniques

9.Analyse the impact of genetic crossover techniques in randompopulation of chromosomes – In order to analyse the impact of crossover technique the following constraints are estimated. (i)generation number of population ii)average distance between each data iii)minimum distance between each data.

10.Estimate the efficiency of Roulette wheel and steady state selection algorithm with respect to running time and memory efficiency - After estimating the genetic crossover technique ,the efficiency of the roulette wheel and steady state selection
algorithm are estimated.

11.Compare the efficiency of Roulette wheel and steady state selection algorithm – After estimating the efficiency of both algorithms, there is a need to compare the efficiency of roulettewheel and steady state selection algorithm based on the initial
population.

Roulette Wheel Selection Method In this method the parents are selected according to their fitness factor.It is the most common method for implementing fitness proportionate selection. Each individual is assigned a slice of circular Roulette wheel, and the size of slice is proportional to the individual fitness of chromosomes. Because the ideal fitness for individuals in the algorithm, the size of each individuals of the roulette wheel will be inversely proportional to their fitness factor value.

Steady State Selection

This method replaces few individuals in
each generation. Only a small number of newly created off springs are put in place of least fit individual. The main idea of steady-state selection is that bigger part of chromosome should retain to

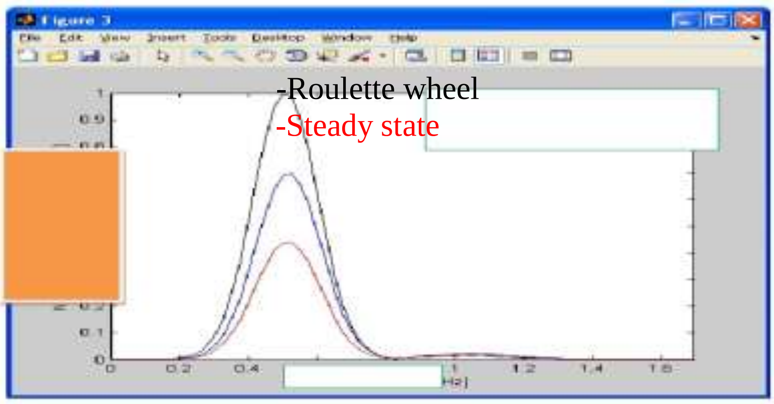
successive population.

TABLE DESIGN

In order to find the optimal solution of large dataset, the roulette wheel selection and steady state selection
method was used. In the initial stage of large dataset all the both of the methods work similarly but in intermediate stage roulette wheel selection method work efficiently to get the best fitness of population.

IMPLEMENTATION RESULTS

Ps problem size	RWS(rouletee wheel selection)		SSS(steadystate selection)		
300	Fbest Best fitness value ie Minimum distance)	CN(generation FR number)	Fbest (best Fitness value ie minimum distance)	CN(Generation FRW Number	
	217.32	85	221.32	84	822
300	142.72	67	168.74	71	647.21



In this paper, MATLAB code has been developed to assess the performance of genetic algorithm by using two different selection techniques on the same population. Average and minimum fitness in each generation is computed over 300 generations and plotted to compare the performance of three approaches.

According to roulette wheel and steady state selection algorithm ,the diagram presented above represents the efficiency of proposed methodology with respect to running time. Red line represents the running time of roulette wheel selection algorithm(4.62 micro sec) and blue colour represents the running time. . The running time efficiency of roulette wheel selection is estimated as 4.62 micro seconds.

CONCLUSION

The main aim for selecting the research problem is to focus and explore and analyzing the incidence of genetic crossover techniques based on roulette wheel selection algorithm and steady state selection

Algorithm .The proposed methodology focuses on the efficient data optimizing algorithm which can find and analyze the crossover technique based on genetic algorithms.

The proposed algorithm is very efficient and accurate compared to the steady state selection algorithm, in searching for the data from large nucleotide data set. The actual knowledge extracted is presented in the form of easy-to-understand rules, while the details of the process such as time taken, file size and memory levels are considered and conveniently summarized.

The proposed roulette wheel selection algorithm is very efficient compared to the steady state selection algorithm, with respect to runtime efficiency and memory efficiency in nucleotide data dataset. It is a numerical computing environment and fourth generation programming language.

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