PART-1

QUESTION-4

ENCODING METHODS

Encoding is a process of representing the solution in the form of a string that is able to convey the necessary information. There are various encoding methods discussed

(1) Binary Encoding : This is one of the most common methods of encoding. Here the chromosomes are strings of 1s & 0s and each position denotes a particular characteristic of the problem.

Ex: 1001001110 01

(2) Permutation Encoding : This is useful in ordering problems. Where each object can be represented as a task to be performed. Used in Travelling Salesman Problem where each number represents a city that needs to be visited.

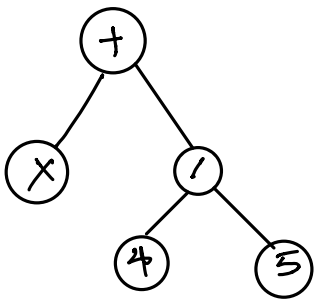
Ex: 1 4 5 3 2 9 8

(3) Value Encoding: This the method useful when more complex values are required to represent a characteristic such as real numbers.

Ex: 1.235, 2.45, 3.96

(4) Tree Encoding: In this method each chromosome is a tree of some objects, such as arithmetic operators for example.

Ex:



OPERATORS

The basic operators that are used in a Genetic Algorithm are:

(1) Initialization: Individual solutions are generated randomly to cover the entire range of possible solutions.

(2) Selection : This is the operator where we use different techniques to select the individuals that can be copied over to the next generation like Roulette-Wheel selection, Tournament selection e.t.c.

Basically a Fitness function is used to quantify the optimality of a solution & rank it accordingly along with others.

(3) Recombination : This is the operation where we decide on which solutions need to be preserved & which need to be died out.

(4) Reproduction : This is the operation where we use operators like crossover, Mutation & Elitism. This is the method where new chromosomes are generated from the existing chromosomes.

(5) Termination : This is the operation where we terminate the genetic algorithm if a solution is found of the required criteria or fixed number of generations is reached, manual inspection. e.t.c.