EE630 Summer 07
Homework 2

Problem 7 – Real Coded Genetic Algorithms

Consider two parents, with $x_1 = 0.2$ and $x_2 = 0.5$. Consider simulated binary crossover with $\eta_c = 1$. Form 1000 children, and plot a histogram of the children arranged in 20 equally spaced bins on the interval 0 to 1. Implement gene repair using ring mapping.

Problem 8 – Real Coded Genetic Algorithms

Repeat problem 7 with $x_2 = 0.25$.

Problem 9 - Real Coded Genetic Algorithms

Suppose a design problem was coded with 5 genes, and single-point crossover was used. During the crossover between two parents, how many different children (in terms of genotype) could be produced ?

Problem 10 – Real Coded Genetic Algorithms / GOSET

A logarithmically mapped gene has a range from 10^{-3} to 10^{6}. If the value for this gene for a particular individual is 37.6, what is its normalized value? What would it's normalized value be if it were linearly mapped.

Problem 11 – Real Coded Genetic Algorithms / GOSET

During an evolution, the minimum, maximum, and average fitness of a population is 1.2, 270, and 40, respectively. If the most fit individual is to be 3 time more likely than the average fit individual to be selected, and the least fit individual is 1/3 as likely as the average fit individual to be selected, what is the scaled fitness of an individual who's raw fitness is 58.

Problem 12 – Real Coded Genetic Algorithms / GOSET

Use GOSET to solve the problem

$$\min f(x_1, x_2, x_3, x_4)$$
$$= (x_1 + 10x_2)^2 + 5(x_3 - x_4)^2 + (x_2 - 2x_3)^4 + 10(x_1 - x_4)^4$$
$$-2 < x_i < 2,\ i = 1, 2, 3, 4$$