Natural Computing

Pauline, Dennis, Joost

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1 Answers

1

Due to no eliteness, we can treat the best member as any other member in the pool.

a) There are 100 individuals, with a mean of 76. That means that the total size of the roulette wheel will be 7600. The current best member has a fitness of 157, so it will occupy $\frac{157}{7600}$th of the roulette wheel. This means that it has roughly a 2% chance of being selected. If we select 100 members, we expect to select the best member $\frac{157}{7600} * 100 \approx 2$ times.

b) The chance that we don't select the fittest member is $1 - \frac{157}{7600}$. So the chance that we never select it is $\left(1 - \frac{157}{7600}\right)^1 00 \approx 0.124$.

2

The fitness function is

$$f(x) = x^2.$$

The members of the pool are $x = 3, x = 5, \text{and} x = 7$. So the total fitness is $3^2 + 5^2 + 7^2 = 83$. The chance to select each individual is:

$x = 3 :\ 9/83 \approx 0.108,$

$x = 5 :\ 25/83 \approx 0.301,$

$x = 5 :\ 49/83 \approx 0.590.$

When using the alternative selection function

$$f_1(x) = x^2 + 8,$$

the total fitness is $83 + 24 = 107$ and we obtain the following results:

$x = 3 :\ 17/107 \approx 0.159,$

$x = 5 :\ 33/107 \approx 0.308,$

$x = 5 :\ 57/107 \approx 0.533.$

We can see that the second function yields a lower selection pressure. This is because the relative boost of 8 is much higher for the less fit individuals. It almost doubles the fitness of the $x = 3$ individual, and only amounts to a 0.16-th increase in fitness of the $x = 7$ individual.

3

TODO: implement a the monte carlo algorithm for counting zeros.

4

Implement the 'simple (1+1)-GA for binary problems. and compare it to the monte carlo solution

5

Something weird with symbolic expressions. (theory)

6

Something weird with symbolic expressions (programming)