Assignment sheet #9.
Artificial Life.

~~Assig # 53~~.

Group Number # 1

Submitted By #
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Assig # 53: points?

(i) Karim Baidar is planning to do the presentation on upcoming week i.e 1st of July 2020.

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(ii) Cüneyt presents in the previous i.e assignment #5 question 34.

(iii) Stephan has also presented it in the previous week

Assignment 55 #:

Solution:

(i) Fitness Ftn (also known as evaluation Ftn) evaluates how close a given solution is the optimum solution of the desired problem. It determine, how fit a solution is.

(ii) Evolutionary Algo: The way evolutionary Algo are usually designed implies that they do not ~~mean~~ make explicit assumptions about the problem to solve and donot exploit the properties of the problem at hand.

- In evolutionary computation, an initial set of candidate solutions is generated and iteratively updated, Each new generation is produced by stochastically removing desired solution and introducing small random changes.

- A population of solutions is subjected to natural selection and mutation. As a result the population will gradually evolve to increase in fitness, in this scenario, the Fitness ftn.

- if we have a set of 5 genes, which can hold one of the binary values 0 and 1, we have to come up with a sequence having all 1's as much as possible. This can be considered as an optimization problem. Here the fitness ftn is considered as the no of 1's present in genome. A Fitness ftn that is 0 is not good. as it doesn't help you get an idea of how close the situation is to right answer.

Assig #54:

(i) probability for individual i to be selected for mating in a population size μ with FPS is:

$$P_{FPS}(i) = f_i \Big/ \sum_{j=1}^{\mu} f_j$$

(ii) Parent: rank based selection.

(i) Attempt to remove problems of FPS by basing selection probabilities on relative rather than absolute fitness.

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Formula:

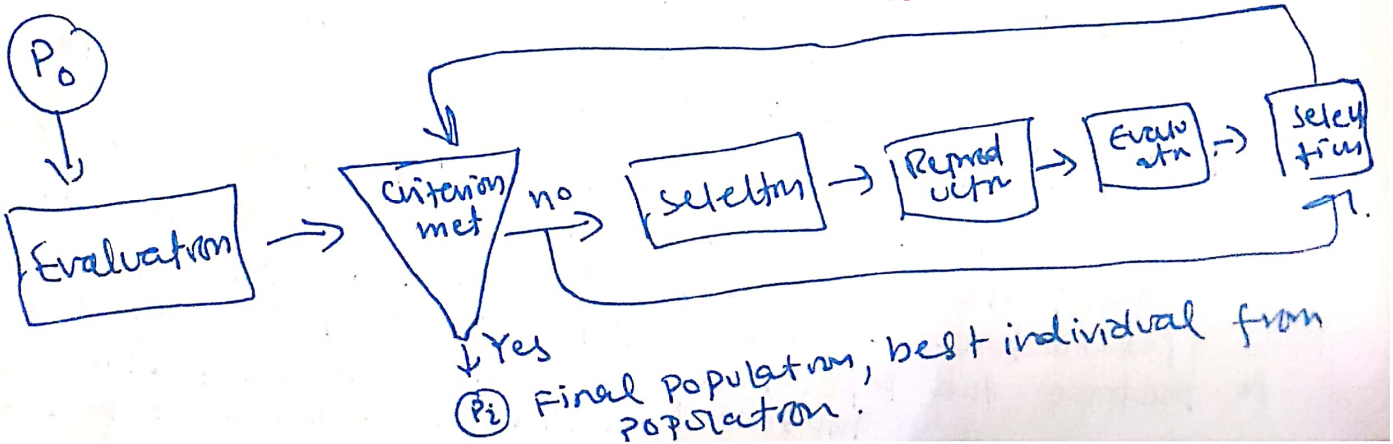
$$P_{lin\text{-}rank}(i) = \frac{(2-s)}{\mu} + \frac{2i(s-1)}{\mu(\mu-1)}$$

μ: size of the parent population.

i: rank of best.

s: is the param controlling the expected no of copies of the highest ranked individuals.

idea okay...
but i did not really get it..



Assign # 58:

- The individuals which have the best fitnesses are reproduced more often than the others and replace the worst ones. Sometimes a population contains a non-optimal super individual with much higher fitness than others.
- Depending on the nature of the parameters of the selection operators it could potentially reproduce much more quickly than the others.
- its copies could then invade the population before the variation operators find better solutions.
- The exploration of the search space become local, since it is limited to a random local search centered on super individual.

depiction?

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- Prevention: we need to push the population to converge to a global optimal solution with the help of selection process. But sometime a super individual that is far better than other individual in the current population. appears in the early stage of EAs. it is actually a local optimal solution. suppose the fitness value of a "super individual" a is 200. the global optimal value is 205. and mean fitness value of other individual is 30. Then RWS will generate $10 \times 200 / (30 \times 9 + 200) = 4.25 \approx 4$ copies of a, if there is no selective bias. which means a will soon dominate whole population. This phenomena is called premature. To prevent this, we want the selection process to preserve the population diversity. as much as possible while giving good individuals more chances to breed.

Assig 59 #

(8)

Solution:

The other step in Evolutionary Algorithm beside the fitness evalution that is most time consuming.

because in crossover, typical parts of individuals are exchanged between two individuals selected to the crossover.

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