

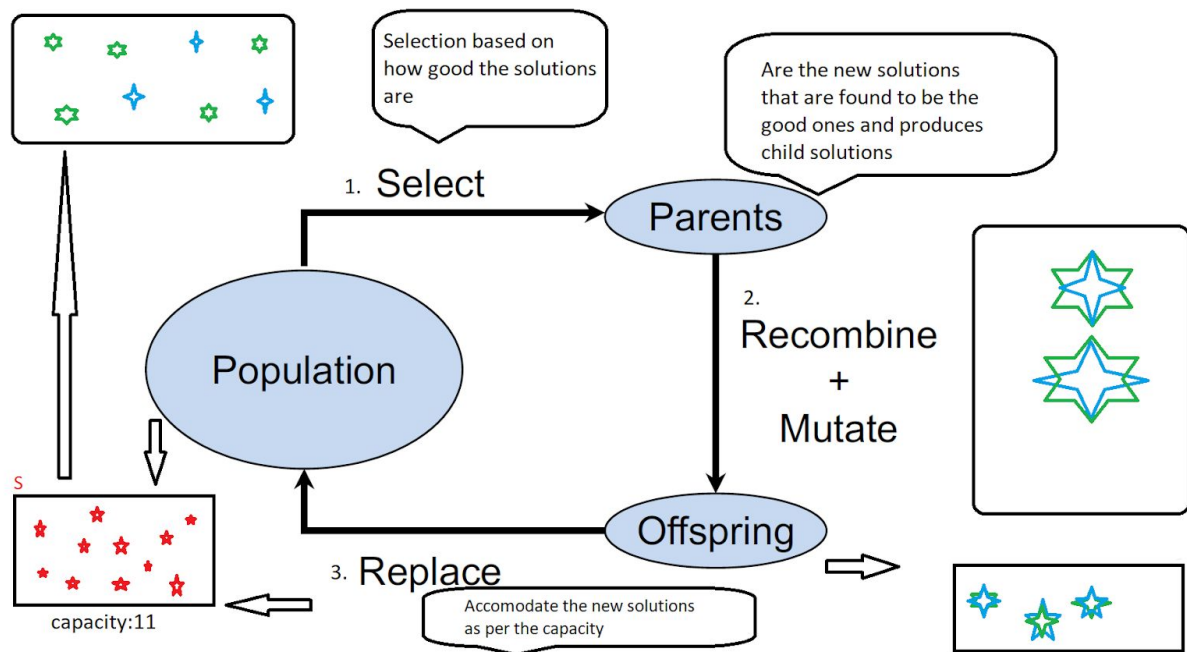
Assignment 13 Basics of Evolutionary Algorithms

Take a look at the concept and components of Evolutionary Algorithms (EA).

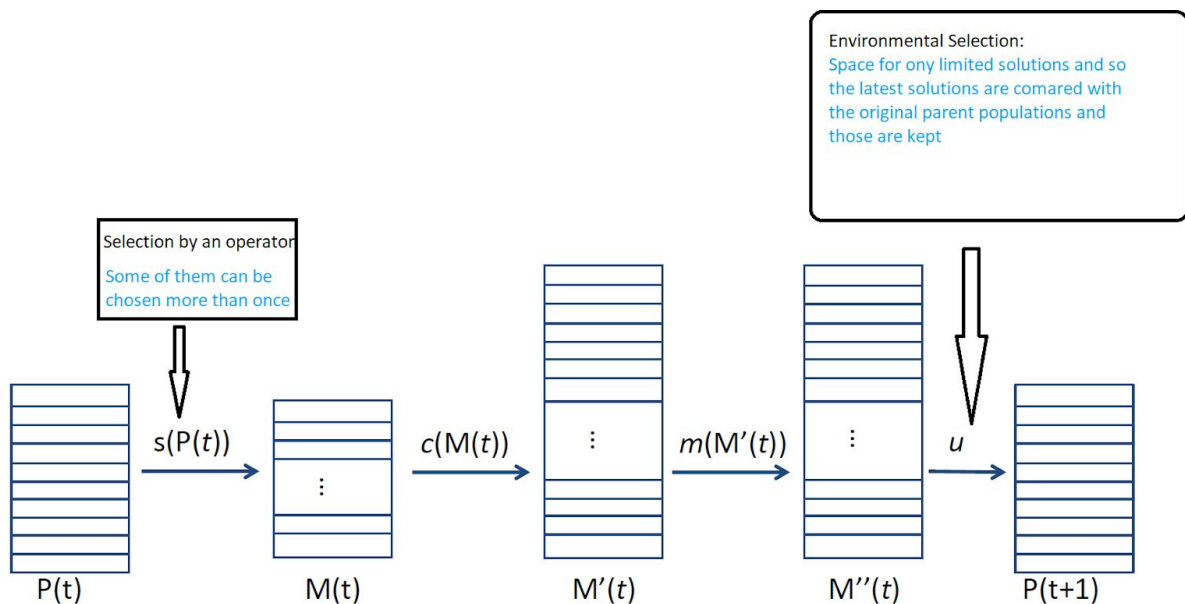
- Considering the evolutionary optimization vocabulary, please indicate what are the genotype, phenotype, individuals, genes and alleles, and their relation with the problem formulation explained in the previous assignment sheet.

Genotype	7 parameters in Search space (S)
Phenotype	The best solutions in solution space (G) that satisfies the objectives
Individuals	All those solutions in decoded space
Genes	Any of the 7 parameters which are defined for the solution
Alleles	Values of the parameters

- Describe the general concept of how an EA works. Which components are necessary for an EA and how do they work together? Show the concept in a graphical way.



- In an EA, selection mechanisms are used in two different parts of the algorithm. Explain what is the purpose of these two selections and what are the differences.



- Would the EA still reach its goal if you replaced one or both of these selection methods by a purely random selection? Justify your answer.

Yes, it would reach its goal if the selection procedure was random. But, it depends on what the actual goal is, first it could be the convergence speed of how the individuals are replaced into the system. Moreover, if we go with some procedural selection then this rate of convergence can be measured in time. Secondly, the fitness of the solutions; in a random selection, it could happen by chance that the bad solutions are chosen and later in any of the stages it requires some engineering techniques to make it survive to the pool which otherwise could be eased with more fit solutions.