A genetic algorithm is a type of optimization technique inspired by the process of natural selection and evolution. It's often used to find solutions to optimization and search problems where the search space is very large and complex.

Here's how it works:

Initialization: A population of potential solutions is generated randomly. Each solution represents a possible solution to the problem.

Selection: Solutions from the population are selected to become "parents" based on their fitness. Solutions with higher fitness (i.e., better solutions) are more likely to be selected for reproduction.

Crossover: Selected solutions (parents) are combined to create new solutions (offspring). This is typically done by exchanging parts of the solutions to create new ones.

Mutation: Occasionally, random changes are made to the offspring to introduce new genetic material into the population. This helps prevent the algorithm from getting stuck in local optima.

Evaluation: The fitness of the new solutions (offspring) is evaluated.

Replacement: The new population is formed by selecting the best solutions from the current population and the offspring.

Termination: The algorithm stops when a stopping criterion is met, such as finding a satisfactory solution or reaching a maximum number of iterations.

>>

The process is iterated until a termination condition is met, such as finding an acceptable solution or reaching a maximum number of iterations.

Genetic algorithms are particularly useful in optimization problems where the search space is large and complex, and where traditional optimization techniques may struggle. They have been applied in various fields such as engineering, finance, bioinformatics, and more.

GA is a meta-heuristic technique solving

optimization problems by imitating natural selection; i.e.,

the adaptation to an environment performed by living

beings [23]. GA is an appealing approach to solve a

complex problem. GA determines not one solution but a

whole ‘population’ of ‘individuals,’ which are candidate

solutions to a problem. Each individual’s distinctive

features are coded into a ‘chromosome’ which is a

string of genes, whose values are chosen from a set of

symbols.

GAs are stochastic search methods managing

a population of simultaneous search positions. A

conventional GA has 3 essential elements:

• a coding of the optimization problem

• a mutation operator

• a set of information-exchange operators

GAs evaluate target function to be optimized at

randomly selected points of a definition domain.

Considering this information, a new set of points (a new

population) is generated. Gradually the population

approaches a function’s local maxima and minima. The

GA’s pseudo code is given below [24].

1. Choose initial population(Random)

2. Repeat (until terminated)

2.1 Evaluate each individual Fitness

2.2 Prune population (Typically all; If not then the

worst)

2.3 Select pairs to mate from best-ranked

individuals

2.4 Replenish population (Selected pairs) Tournament used

2.4.1 Apply Crossover operator

2.4.2 Apply mutation operator

3. Check for termination criteria

3.1 Loop if not terminating(Repeat from step 2)