

In the name of God

4. Comparison of Metaheuristic Algorithms

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Emergence Time

- GA: 1975
- ACO: 1991
- TS: 1986
- SA: 1986

Innovator

- GA: John Holland
- ACO: Marco Dorigo
- TS: Fred Glover
- SA: A. Kirkpatrick

Source of Inspiration

- GA: Evolution Principle
- ACO: The foraging behavior of ant colonies
- TS: a prohibition imposed by social custom as a protective measure or something banned as constituting a risk.
- SA: physical annealing

Originally Purpose

- GA: for solving combinatorial problems
- ACO: for solving combinatorial problems
- TS: for solving combinatorial problems
- SA: for solving combinatorial problems

Population or Single solution orientation

- GA: Population-based algorithm
- ACO: Population & Single based
- TS: Single based
- SA: Single solution

Using Memory

- GA: Memory less
- ACO: Using memory to store amount of pheromones
- TS: Short term (tabu lists), midterm and long term memory
- SA: Memory less

Generating Initial Solution

- GA: Random
- ACO: Random / Local search
- TS: Local search
- SA: Random

Finding Neighbor Solutions

- GA: Random search of neighbouring solutions
 - using **mutation operator**
- ACO: Random search of neighbouring solutions
 - using **random proportional rule**
- TS: Deterministic/random search of neighbouring solutions
- SA: Random search of neighbouring solutions

Number of Neighbour Solutions Considered at Each Move

- GA: One neighbour solution
- ACO: n neighbour solutions
- TS: n neighbour solutions
- SA: One neighbour solution

Finding Local Optimum

- GA: Mutation operator
- ACO: Accumulation pheromone on better solutions
- TS: Based on a local search
- SA: Decreasing temperature and limiting search space

Escaping from Local Optimum

- GA: Random search of search space
 - Using crossover operator
- ACO: Evaporation mechanism
- TS: Deterministic acceptance of non-improving solutions & jump to unvisited search space
 - Using tabu lists and diversification
- SA: Probabilistic acceptance of non-improving solutions
 - based on **acceptance function** and temperature parameter



The End