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3 Ant colony optimization :

Algorithm :

Step 1 Initialize Parameters :
α : Importance of pheromone trails
β : Importance of heuristic information
ρ : Pheromone evaporation rate
Q : Constant that affects pheromone deposit
Initialize pheromone levels (T_{ij}) on all edges

Step 2 Construct solution (Foraging) :
. place 'm' ants on random nodes
. Each ant builds a sol^{n} by moving from one node to another based on the probabilistic transition rule :

$$P_{ij} = \frac{T_{ij}^{\alpha} \cdot n_{ij}^{\beta}}{\sum_{k \in \text{allowed}} T_{ik}^{\alpha} \cdot n_{ik}^{\beta}}$$

where :
T_{ij} : Pheromone level on edge (i, j)
n_{ij} : Heuristic information
Allowed : set of unvisited nodes.

Step 3 Evaluate Solutions
> Evaluate the quality of each solution

Step 4 update pheromones :

Step 5 Repeat & Return the Best sol^{n}

Foraging : refers to the process by which animals search for & gather food from their environment.
pheromones : guiding artifical ants to promising sol^{n} based on prior experience.
Trail pheromones : mark paths b/w a nest & food sources.

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Pseudo-code:

initialize pheromone levels
for iteration in max_iterations:
    for each ant:
        construct sol^{-n} using probabilistic rule
    evaluate sol^{-n}'s
    update pheromones
return best sol^{-n}

> Implementing Ant colony optimization for solving a network optimization problem
[AI] demonstrates routing in a graph to find shortest path b/w a source & destination which is a common challenge in network optimizatio