

Ants Lab

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A first ant-colony optimization roadmap:

1- With the code provided to generate graphs, generate the connection matrix, weight matrix, paths, and distance matrix

2-Generate the pheromone matrix.

3-Write a function that, given a path P, calculates the length of the path by summing the distances covered at each step, according to

$$L(P_n) = \sum_{j \in P_n} d_{j,j+1}$$

4-Write a function that, given a sequence of vertices, simplifies it (i.e., whenever the sequence has a repeated vertex, the subsequence between the two instances of the repeated vertex is removed together with one occurrence of the repeated vertex). For example, 1,2,3,2,4 should be simplified to 1,2,4, eliminating the jump from 2 to 3 and back. Another example: 1,2,3,5,6,2,4,5,3 can become either 1,2,4,5,3 by elimination of the subsequence between the repeated 2 or 1,2,3 by elimination of the subsequence between the repeated 3.

5-Code a function that implements the branch decision rule given by the equation $p_{ij} = \frac{w_{ij}^\alpha \tau_{ij}^\beta}{\sum_{\langle i,k \rangle} w_{ik}^\alpha \tau_{ik}^\beta}$ with $0 < \alpha < 1$ and $\beta \geq 1$

6. Write a function that updates τ_{ij} according to the rules $\Delta\tau_{ij,n}$

Example solution

