

Стохастическое Моделирование

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Traveling Salesman problem

Some details on Simulated Annealing algorithm implementation:

1. Consider $N = 100$ cities uniformly at random distributed on a square 10×10 , generate their positions using rand.
2. Energy cost function is given by Euclidean distance

$$E = L = \sum_{i=1}^N \sqrt{(x_i - x_{i+1})^2 + (y_i - y_{i+1})^2}$$

3. A tour (trip) is defined by permutation of integers corresponding to the city labels
4. Select initial configuration randomly (or using nearest neighbours search)
5. A move (new trial configuration) is given by swapping two random cities and reversing the route between them
6. Cooling schedule can be chosen as $T_k = \alpha T_0/k$ or $T_k = \alpha T_0/\log k$, or $T_k = T_0/\alpha^k$, where k is an iteration number (accepted step) and α is experimentally determined coefficient.
7. As a result, return the optimal found sequence of the visited cities in the tour and draw the tour on the same square

Continues Minimization

Some details on Simulated Annealing algorithm implementation:

1. Find global minimum of the following function:

$$f(x, y) = x^2 + 2y^2 - 0.3 \cos(3\pi x) - 0.4 \cos(4\pi y), \quad \text{for } -1 \leq x, y \leq 1$$

2. Perform multiple random starts (100-1000) and select the best result for the final solution
3. As a result, return the minimum found and draw a sequence of steps that led to the solution with superimposed isocontours of the function (use contour command to visualize the function).