

### **Monte Carlo optimization**

Monte Carlo methods are widely used for optimization. Consider the following problem: Given a set of  $N$  objects and pairwise similarity between them  $s_{ij}$ , find the optimal order of the objects  $R=(i_1, i_2, \dots, i_N)$  such that we maximize the “total similarity” of adjacent objects in  $R$ .

E.g.  $R=(5,6,7,4,3,1,2)$ .

- a) Come up with the “energy” to be minimized in Monte Carlo simulations.
- b) Suggest a move- set to be used in simulations.
- c) Write down a code for Metropolis procedure to be used in simulations.
- d) How would you choose “a temperature” for the simulations?

### **Other sample quiz questions**

What is an Ising model? What physical system does it model and how do you compute the energy of the system?

What is Simulated Annealing? Describe the structure of an algorithm for simulated annealing.

What is Genetic Algorithm? What are the commonalities and differences between Simulated Annealing and Genetic Algorithm?