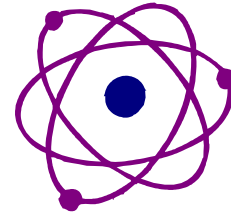


ECEN 5773 Intelligent Systems Fall 2001



Midterm Exam

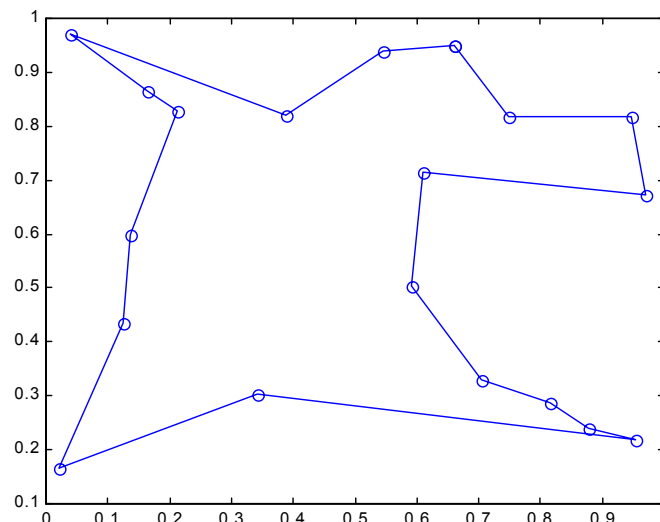
Optimization

Solve the traveling salesman problem with 20 cities that are uniformly distributed within a unit square in a 2-dimensional plane. The coordinates of 20 cities are given below in a 2×20 matrix:

$$\text{cities} = \begin{bmatrix} 0.6606, 0.9695, 0.5906, 0.2124, 0.0398, 0.1367, 0.9536, 0.6091, 0.8767, 0.8148 \\ 0.9500, 0.6740, 0.5029, 0.8274, 0.9697, 0.5979, 0.2184, 0.7148, 0.2395, 0.2867 \\ 0.3876, 0.7041, 0.0213, 0.3429, 0.7471, 0.5449, 0.9464, 0.1247, 0.1636, 0.8668 \\ 0.8200, 0.3296, 0.1649, 0.3025, 0.8192, 0.9392, 0.8191, 0.4351, 0.8646, 0.6768 \end{bmatrix}.$$

To stimulate this topic, this homework is to

- search literature for the techniques/tools applicable for various discrete optimization problems (e.g., genetic algorithm, simulated annealing, Hopfield network, tabu search);
- registered your “algorithm” for approval (on first-come first-take basis);
- realize your chosen algorithm in Matlab or C and seek to achieve the “best” and “average” performances;
- write a 3-5 page report to
 - overview the algorithms chosen
 - problem formulation
 - flow chart and simulation results
 - software codes
 - references
- show the “best” route you find and the associated distance with attached computer coding (with *documentation*).



ECEN 5773 TSP Record Book

- Genetic algorithm [4.5969]
- Hopfield neural network [4.1395]
 - Tabu search [4.2003]
- Elastic neural network [4.0306]
- *Simulated annealing* [4.0185]
- Immune algorithm [4.6549]
- *Self-organization map* [4.0185]
 - Ant colony [4.1387]

Potential Candidate Algorithms

Branch-and-Bound algorithm

Simulated electric field

Evolutionary strategy

DNA and molecular computing

Petri Net

Dual-mode dynamic neural network (D2NN)

Boolean neural network

Adaptive ring