abstract

COMPUTER SCIENCE AND DISCRETE MATHEMATICS SEMINAR I
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

We show a (3/2-\epsilon)-approximation algorithm for the graphical traveling salesman problem where the goal is to find a shortest tour in an unweighted graph G. This is a special case of the metric traveling salesman problem when the underlying metric is defined by shortest path distances in G. The result improves on the 3/2-approximation algorithm due to Christofides for the case of graphical TSP.

Similar to Christofides, our algorithm first finds a spanning tree whose cost is upper-bounded by the optimum and then it finds the minimum cost Eulerian augmentation of that tree. The main difference is in the selection of the spanning tree. Except in certain cases where the solution of LP is nearly integral, we select the spanning tree randomly by sampling from a maximum entropy distribution defined by the linear programming relaxation.

Despite the simplicity of the algorithm, the analysis builds on a variety of ideas such as properties of strong Rayleigh measures from probability theory, graph theoretical results on the structure of near minimum cuts, and the integrality of the T-join polytope from polyhedral theory. This is joint work with Shayan Oveis Gharan and Amin Saberi.