CS512: DATA STRUCTURES AND ALGORITHM
PROJECT PROPOSAL

KIDNEY PAIRED DONATION OPTIMAL MATCHINGS IN BIPARTITE GRAPHS

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Intent of Project:

This project is an application for 'Kidney paired donation' using Hungarian algorithm with visualization. This visualization explains the working of the Hungarian algorithm using the real-world application. The Hungarian method is a combinatorial optimization algorithm that solves the assignment problem in polynomial time and which anticipates later primal–dual methods.

Application:

A practical, real world implementation of this algorithm is in matching kidney donors to kidney donor recipients. We find donor-recipient pairs in which the donors in one pair are compatible with the recipients in the other. To save as many lives as possible, a maximum matching on a graph is performed, with the vertices representing donor-recipient pairs and the non-negative weights of the edges representing the compatibility of the Donors with the patients.

Approach:

The algorithm is easier to describe if we formulate the problem using a bipartite graph. We have a complete bipartite graph { G=(S,T;E)}G=(S, T; E) with m Donor vertices (S) and n Patient vertices (T), and each edge has a non-negative match percentage. We want to find a perfect matching with a maximum match. The application will be able to resolve the matching problem even if the number of donors and patients aren't the same.