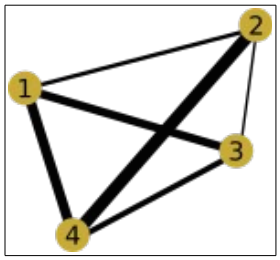
The Quadratic Assignment Problem

Martino Ferrari

1. Quadratic Assignment Problem

The quadratic assignment problem (QAP) is one of the fundamental combinatorial optimization problems.
It models one common logistic problem, and it is part of the *facility location* category of problems.



The QAP models the following situation:
There are a set of n facilities and a set of n locations. For each pair of locations, a distance is specified and for each pair of facilities a weight is specified (e.g., the amount of supplies transported between the two facilities). The problem is to assign all facilities to different locations with the goal of minimizing the sum of the distances multiplied by the corresponding flows.[1]

It easy to see the size of S (the solutions space) is $!n$ and in the real life cases n is often big enough to make S not fully explorable. We can formalize the problem in this way:

$n \in R$, $W \in R^n$, $D \in R^n$