Manual Optimization Decisions

Problem 1 (Physical Visualization Design Problem) *Given an interface I, and a set of constraints, and a user interaction trace, identify the optimal placement policy P^* that will minimize the response time for the trace.*

Notations:

M_c: Client memory size

M_s: Server memory size

D_s: Server disk size

Let:

$$x_{ij} = \begin{cases} 1 & \text{if place result of } query_i \text{ on } storage_j \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

where storage 0, 1, 2 are client memory, server memory, server disk respectively. Suppose r_{ij} is the delay we can reduce by placing the result of $query_i$ on $storage_j$ given by some cost model. We can solve the matrix x using integer programming:

Maximize $\sum_{i=1}^{n} \sum_{j=1}^{3} x_{ij} r_{ij}$

subject to:

$\sum_{j=1}^{3} k_{ij} \leq 1, (i = 1, 2, \ldots, n)$ – Placement is non-inclusive

$\sum_{i=1}^{n} k_{i0} \leq M_c$ – Client memory size

$\sum_{i=1}^{n} k_{i1} \leq M_s$ – Server memory size

$\sum_{i=1}^{n} k_{i2} \leq D_s$ – Server disk size