CS 170 Project Algorithm

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1 QP

Algorithm 1: Quadratic program for Graph Partitioning with Dynamic Constraints

Input: $i, j,\ h_{i,j},\ s_{i,j}\ \ \forall i, j,$, R, S_{max}

Output: {room$_r$: [people $\in$ room$_r$]}

Initialization:

$e_{i,j_k} \leftarrow \forall i, j\ \ \&\ \ k = \{1, \dots K\}$

$v_{i_k} \leftarrow \forall i\ \ \&\ \ k = \{1, \dots K\}$

Objective:

$\max\{e_{i,j_k} * h_{i,j}\},\ \ \forall i, j\ \ \&\ \ k = \{1, \dots K\}$

Constraints:

$\sum_{k=1}^{K} e_{i,j_k} = 1,\ \ \forall i, j$

$\sum_{(i,j)} e_{i,j_k} \leq \frac{S_{max}}{K},\ \ k = \{1, \dots K\}$

$e_{i,j_k} = v_i v_j,\ \ \forall i, j\ \ \&\ \ k = \{1, \dots K\}$

2 LP

Algorithm 2: Linear program for Graph Partitioning with Dynamic Constraints

Input: $i, j,\ h_{i,j},\ s_{i,j}\ \ \forall i, j,$, K, S_{max}

Output: {room$_r$: [people $\in$ room$_r$]}

Initialization:

$e_{i,j_k} \leftarrow \forall i, j\ \ \&\ \ k = \{1, \dots K\}$

$v_{i_k} \leftarrow \forall i\ \ \&\ \ k = \{1, \dots K\}$

Objective:

$\max\{e_{i,j_k} * h_{i,j}\},\ \ \forall i, j\ \ \&\ \ k = \{1, \dots K\}$

Constraints:

$\sum_{k=1}^{K} e_{i,j_k} = 1,\ \ \forall i, j$

$\sum_{(i,j)} e_{i,j_k} \leq \frac{S_{max}}{K},\ \ k = \{1, \dots K\}$

$e_{i,j_k} \leq v_{i_k}\ \ \forall i\ \ \&\ \ k = \{1, \dots K\}$

$e_{i,j_k} \leq v_{j_k}\ \ \forall i\ \ \&\ \ k = \{1, \dots K\}$

$e_{i,j_k} \geq v_{i_k} + v_{j_k} - 1\ \ \forall i, j\ \ \&\ \ k = \{1, \dots K\}$