IE400 – Principles of Engineering Management

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Course Project

LP Model for Shortest Path

Starting City: Nevşehir

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Parameters:

$c_{i,j}$: the distance between adjacent city i to city j, ∞ if city i and city j not adjacent

C matrix containing distance values for adjacent cities has been constructed by using the city_distances.xslx file provided in the assignment description [1].

Decision Variables:

$x_{i,j}$: 1 if the shortest path contains the path from city i to city j

0 if the shortest path does not contain the path from city i to city j

Objective Function:

$$\min \ \sum_{i,j} \left(c_{i,j} x_{i,j} \right)$$

Constraints:

$$\sum_{j} \left(x_{i,j} - x_{j,i} \right) = \begin{cases} 1, & i \ = \ \text{source city index} \\ \text{-}1, & i \ = \ \text{target city index} \\ 0, & \text{otherwise} \end{cases}$$

$$x_{i,j} = \{0, 1\} \ \forall \ (i, j) \ i \geq 1, i \leq 81, j \geq 1, j \leq 81$$

References

[1] https://courses.ie.bilkent.edu.tr/ie400/wpcontent/uploads/sites/8/2017/12/ city_distance.xls