Delivery schedule optimization for Direct Store Delivery categories

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September 29, 2021

Abstract

Replenishment at Target in its current state focusses on filling up the sales floor capacity (planogram) and stocking future demand in the backroom.

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1 Travelling Salesman Problem

The travelling salesman problem (TSP) is about given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city

Data Used:

$i \in I$

$j \in I$

D_{ij}

Decision variables:

$$X_{ij} = \begin{cases} 1, & \text{if sales man travels from } i \text{ to } j \text{ in optimal route} \\ 0, & \text{otherwise} \end{cases}$$

$U_i \in Integer$

$U_j \in Integer$

Objective function:

$$\min \sum_{i \in I} \sum_{j \in I} X_{ij} \times D_{ij} \tag{1}$$

s.t.

Each node should be entered and exited exactly once

$$\sum_{i} X_{ij} = 1 \qquad \forall j \tag{2}$$

$$\sum_{j} X_{ij} = 1 \qquad \forall i \tag{3}$$

Eliminate subtours

$$U_i - U_j + N \times X_{ij} = N - 1 \quad \forall i \in 1, 2..N-1 \;\; j \in 2, 3..N \tag{4}$$