ECE 457A Assignment 2

Jason Shao, Minghao Lu

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4. (a) (i) Sol $= [R_1, R_2, ..., Rm]$ where R_i is the order list of cities (represented by the number of the city) visited by vehicle i, $\cup_{i=1}^{m} R_i = \{1, \ldots, c\}$, and $i \neq j \rightarrow R_i \cap R_j$

   (ii) We'll define two neighbourhood operations.

   A. Take a city from some route $R_i \in Sol$, and swap it with another city from some route $R_j \in Sol$

   B. Take a city from some route $R_i \in Sol$, and insert it in some position of some route $R_j \in Sol$

   The neighbourhood of a solution Sol are all the solutions that can be reached from Sol with a single application of one of the above two neighbourhood operations.

   (iii) Let n_i be the length of R_i, we can define $cost(R_i) = Depot[R_i[0]] + D[R_i[0], R_i[1]] + D[R_i[1], R_i[2]] + \cdots + D[R_i[n_i - 1], R_i[n_i]] + Depot[R_i[n_i]]$. A suitable objective function of a solution is: $\sum_{i=1}^{m} cost(R_i)$.

   (b) I'm going to assume the service time of each customer is given in a vector S where $S[i] = s_i$. Define $time(R_i) = cost(R_i) + \sum_{c \in R_i} S[c]$. We can define a new objective function suitable for this modified problem as: $\sum_{i=1}^{m} (cost(R_i) + (time(R_i) - T) * LARGECONSTANT)$.