Travelling Saleman Problem

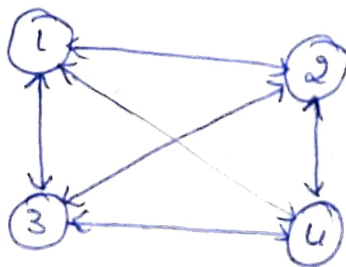$$g(i,s) = \min_{k \in s} \{ c_{ik} + g(k, s - \{x\}) \}$$

i = from vertex

s = remain vertices excluding i

objective:- Given a set of cities and distance between every pair of cities, the problem is to find the shortest possible route that visits every city exactly once and returns to the starting point.

Example:

$$A = \begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline 1 & 0 & 10 & 15 & 20 \\ 2 & 5 & 0 & 9 & 10 \\ 3 & 6 & 13 & 0 & 12 \\ 4 & 8 & 8 & 9 & 0 \end{array}$$

i) Take a starting vertex

$$\min(10+25, 15+25, 20+23)$$

$$= \underline{35}$$

$$\min(9+20, 10+15) = 25$$

$$\min(13+18, 12+13)$$
$$= 25$$

$$\min(8+15, 9+18)$$
$$= 23$$

$$12+8 = 20$$

$$9+6 = 15$$

$$8+5 = 13$$

$$10+9 = 18$$

$$9+6 = 15$$

$$13+5 = 18$$