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Course: CSE 208

Offline 9

Report:

In this offline, we solved the “Travelling Salesman Problem” (TSP) via an exact brute solution and a quicker branch & bound solution.

For the brute, a recursive search for all possible paths was used, which has time complexity $O(n!)$. This approach could only work upto 13 nodes, since any more nodes made the code too slow.

For branch and bound, we used the same recursive searching, but we pruned the search space by stopping the recursion when it was evident that remaining path’s lower bound was worse than current optimal answer. We started with optimal answer = a greedy tour. And for lower bound of remaining path we used the formula = $\sum_{u \text{ not used}} \frac{\min d(u,v) + \min d(v,u)}{2}$. Since this lower bound is indeed less than or equal then actual lower bound, so the solution is correct.

Data:

Name of Graph	# of Nodes	Exact Algorithm		BnB Algorithm	
		Distance	Time (s)	Distance	Time (s)
data10	10	212	0.166	212	0.007
data11	11	202	1.432	202	0.008
data12	12	264	17.080	264	0.014
data13	13	269	217.408	269	0.043
data14	14	-	-	125	0.093
data15	15	-	-	291	0.372
data16	16	-	-	156	0.158
data17	17	-	-	2085	134.989
data18	18	-	-	187	1.895
rby1599	1599	-	-	-	-
xqf131	131	-	-	-	-
xgg237	237	-	-	-	-
dj38	38	-	-	-	-
lu980	980	-	-	-	-
nu3496	3496	-	-	-	-
qal194	194	-	-	-	-
rw1621	1621	-	-	-	-
wi29	29	-	-	-	-

