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INFSCI 2591

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13 April 2025

Project 3

1. Theoretical Time Complexity of Nearest Neighbor and Nearest Insertion

Nearest Neighbor: Uses a nested for loop to compute the path each loop runs n times. Total usage is n2. O(n2)

Nearest Insertion: Uses nested for loops twice: once to determine starting link and once to compute the path by nearest neighbor. Each usage goes runs n2 times, for a total of 2n2. O(n2)

2.

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| --- | --- | --- | --- |
| Algorithm | File | Tour: Sequence of Nodes | Total Weight |
| Nearest Neighbor | 4n | 0, 1, 2, 3, 0 | 2611 |
| 5n | 0, 3, 2, 4, 1, 0 | 1290 |
| 6n | 0, 5, 3, 4, 1, 2, 0 | 3198 |
| 7n | 0, 6, 4, 3, 1, 5, 2, 0 | 2425 |
| 8n | 0, 2, 4, 1, 6, 3, 5, 7, 0 | 2898 |
| 9n | 0, 8, 1, 6, 5, 2, 3, 7, 4, 0 | 2842 |
| 10n | 0, 7, 8, 4, 2, 6, 5, 3, 1, 9, 0 | 3008 |
| 11n | 0, 1, 6, 4, 8, 2, 9, 7, 5, 10, 3, 0 | 3350 |
| 12n | 0, 8, 3, 5, 6, 4, 7, 11, 10, 2, 1, 9, 0 | 2646 |
| 13n | 0, 9, 2, 11, 7, 12, 3, 6, 1, 5, 4, 8, 10, 0 | 3653 |
| Nearest Insertion | 4n | 0, 1, 2, 3, 0 | 2611 |
| 5n | 2, 3, 0, 1, 4, 2 | 1728 |
| 6n | 1, 4, 2, 3, 5, 0, 1 | 2130 |
| 7n | 0, 6, 4, 3, 1, 5, 2, 0 | 2425 |
| 8n | 3, 5, 4, 1, 6, 0, 2, 7, 3 | 3099 |
| 9n | 1, 6, 5, 2, 3, 0, 8, 7, 4, 1 | 2808 |
| 10n | 2, 4, 8, 3, 1, 6, 5, 9, 7, 0, 2 | 2819 |
| 11n | 0, 1, 6, 4, 8, 2, 9, 7, 5, 10, 3, 0 | 3350 |
| 12n | 10, 11, 8, 3, 5, 6, 4, 7, 2, 1, 0, 9, 10 | 2348 |
| 13n | 1, 5, 4, 7, 12, 3, 11, 0, 9, 2, 6, 8, 10, 1 | 4254 |
| Dynamic Programming | 4n | 0, 1, 2, 3, 0 | 2611 |
| 5n | 0, 1, 2, 4, 3, 0 | 1146 |
| 6n | 0, 1, 4, 2, 3, 5, 0 | 2455 |
| 7n | 0, 1, 5, 2, 3, 4, 6, 0 | 1993 |
| 8n | 0, 2, 4, 1, 7, 5, 3, 6, 0 | 2667 |
| 9n | 0, 3, 2, 4, 1, 6, 5, 7, 8, 0 | 2439 |
| 10n | 0, 5, 6, 2, 4, 9, 1, 3, 8, 7, 0 | 2953 |
| 11n | 0, 1, 6, 10, 5, 2, 9, 7, 8, 4, 3, 0 | 2701 |
| 12n | 0, 6, 4, 7, 5, 3, 8, 1, 2, 10, 11, 9, 0 | 1907 |
| 13n | 0, 11, 2, 9, 10, 7, 8, 4, 5, 1, 6, 3, 12, 0 | 2523 |
| Branch-and-Bound | 4n | 0, 1, 2, 3, 0 | 2611 |
| 5n | 0, 3, 4, 2, 1, 0 | 1146 |
| 6n | 0, 1, 4, 2, 3, 5, 0 | 2455 |
| 7n | 0, 6, 4, 3, 2, 5, 1, 0 | 1993 |
| 8n | 0, 2, 4, 1, 7, 5, 3, 6, 0 | 2667 |
| 9n | 0, 3, 2, 4, 1, 6, 5, 7, 8, 0 | 2439 |
| 10n | 0, 7, 8, 3, 1, 9, 4, 2, 6, 5, 0 | 2953 |
| 11n | 0, 1, 6, 10, 5, 2, 9, 7, 8, 4, 3, 0 | 2701 |
| 12n | 0, 6, 4, 7, 5, 3, 8, 1, 2, 10, 11, 9, 0 | 1907 |
| 13n | 0, 11, 2, 9, 10, 7, 8, 4, 5, 1, 6, 3, 12, 0 | 2523 |