

# Candidate Moves Algorithm for TSP Problem

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## Implemented Algorithms

### Pseudocode

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# TODO: Add algorithm pseudocode here
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## Experiment Results

### Objective function

Algorithm	TSPA	TSPB
Random Solution	265,165.54 (238,849.00 - 288,140.00)	212,968.97 (194,376.00 - 245,960.00)
Greedy Cycle	72,635.98 (71,488.00 - 74,410.00)	51,400.60 (49,001.00 - 57,324.00)
Nearest Neighbor Any	73,178.55 (71,179.00 - 75,450.00)	45,870.25 (44,417.00 - 53,438.00)
Nearest Neighbor End	85,108.51 (83,182.00 - 89,433.00)	54,390.43 (52,319.00 - 59,030.00)
NearestNeighborAny2Regret_w1_1	72,401.24 (70,010.00 - 75,452.00)	47,664.46 (44,891.00 - 55,247.00)
NearestNeighborAny2Regret_w0_1	117,138.49 (108,151.00 - 124,921.00)	74,444.46 (69,933.00 - 80,278.00)
GreedyCycle2Regret_w1_1	72,148.23 (71,108.00 - 73,718.00)	50,997.35 (47,144.00 - 56,747.00)

Algorithm	TSPA	TSPB
GreedyCycle2Regret_w0_1	116,681.18 (108,804.00 - 123,447.00)	70,264.65 (65,043.00 - 76,325.00)
SteepestLS_Edges_Random	73842.79 (71576.00 - 78846.00)	48374.04 (46064.00 - 52759.00)
SteepestLS_Nodes_NearestNeighborAny2Regret_w1_1	72010.01 (69801.00 - 75440.00)	47137.03 (44488.00 - 54391.00)
GreedyLS_Nodes_NearestNeighborAny2Regret_w1_1	72001.06 (69801.00 - 75440.00)	47103.65 (44456.00 - 52416.00)
SteepestLS_Nodes_Random	88217.17 (80895.00 - 97487.00)	63017.43 (54687.00 - 72635.00)
GreedyLS_Edges_Random	73856.40 (71444.00 - 76883.00)	48202.11 (45536.00 - 51754.00)
GreedyLS_Edges_NearestNeighborAny2Regret_w1_1	70936.85 (69497.00 - 72850.00)	46397.24 (44320.00 - 51672.00)
GreedyLS_Nodes_Random	86465.01 (80812.00 - 94777.00)	60805.92 (53522.00 - 69566.00)
SteepestLS_Edges_NearestNeighborAny2Regret_w1_1	70722.29 (69540.00 - 72546.00)	46342.04 (44320.00 - 51431.00)
<b>CandidateMoves_k10_Edges_NearestNeighborAny2Regret_w1_1</b>	70950.55 (69540.00 - 73830.00)	46363.69 (44378.00 - 51710.00)
<b>CandidateMoves_k10_Edges_Random</b>	74166.95 (71665.00 - 80727.00)	48393.12 (46270.00 - 50834.00)
<b>CandidateMoves_k10_Nodes_NearestNeighborAny2Regret_w1_1</b>	72038.13 (69801.00 - 75440.00)	47192.71 (44488.00 - 54627.00)

<b>Algorithm</b>	<b>TSPA</b>	<b>TSPB</b>
<b>CandidateMoves_k10_Nodes_Random</b>	90248.02 (82373.00 - 98681.00)	64866.99 (55645.00 - 75417.00)

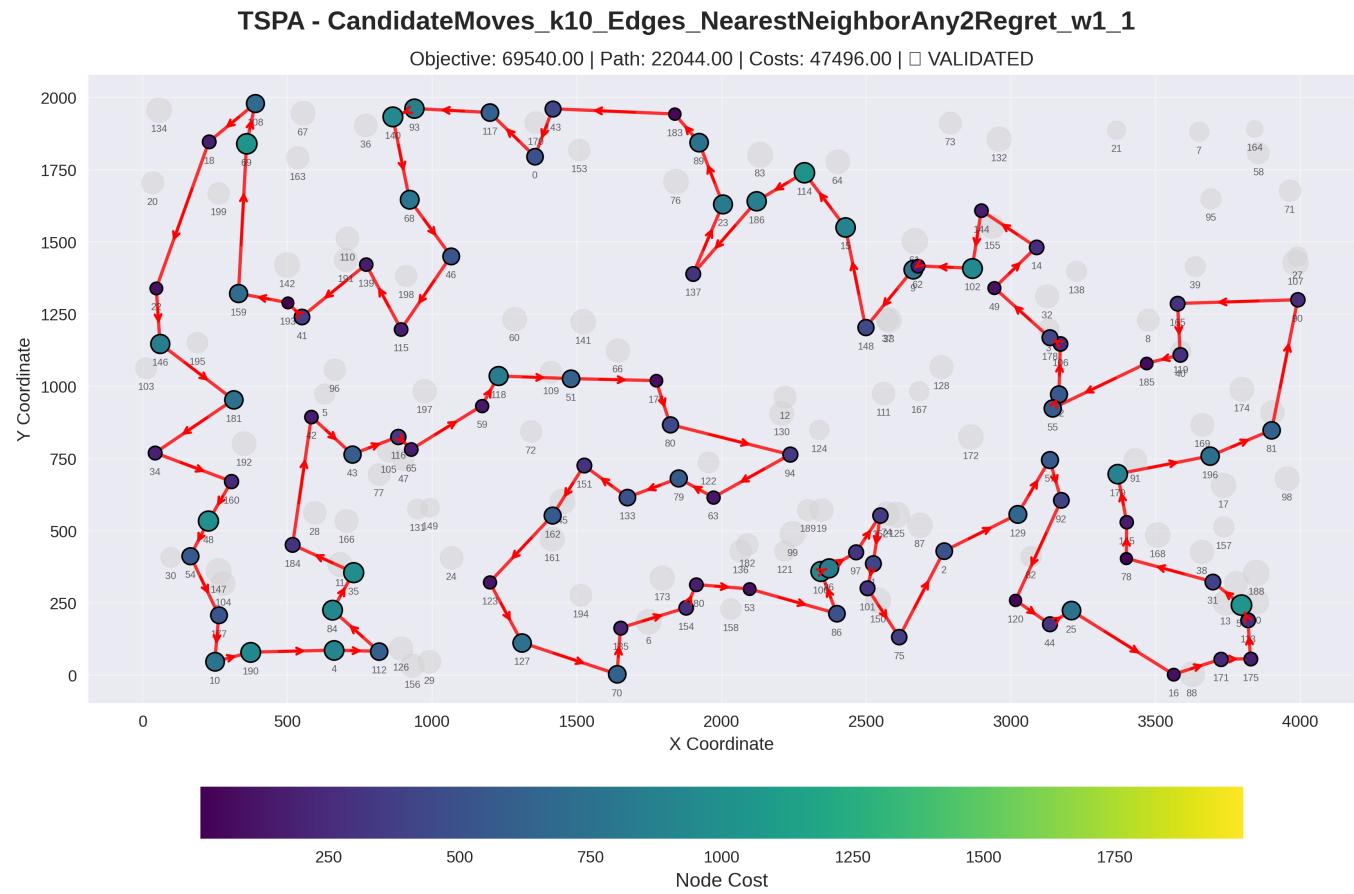
## Computation Times (ms)

<b>Algorithm</b>	<b>TSPA</b>	<b>TSPB</b>
NearestNeighborAny2Regret_w0_1	2.83 (2 - 6)	2.71 (2 - 5)
NearestNeighborAny2Regret_w1_1	3.08 (2 - 18)	2.76 (2 - 6)
GreedyCycle2Regret_w0_1	3.82 (3 - 5)	4.02 (3 - 5)
GreedyCycle2Regret_w1_1	4.22 (3 - 21)	4.08 (3 - 5)
RandomSolution	0.18 (0 - 6)	0.04 (0 - 1)
NearestNeighborEnd	0.36 (0 - 2)	0.15 (0 - 1)
NearestNeighborAny	2.81 (1 - 57)	2.04 (1 - 3)
GreedyCycle	2.58 (1 - 17)	2.62 (1 - 54)
SteepestLS_Nodes_NearestNeighborAny2Regret_w1_1	5.07 (3 - 26)	6.48 (4 - 11)
SteepestLS_Edges_NearestNeighborAny2Regret_w1_1	6.30 (3 - 12)	8.11 (5 - 15)
GreedyLS_Nodes_NearestNeighborAny2Regret_w1_1	6.32 (4 - 14)	10.07 (5 - 26)
GreedyLS_Edges_NearestNeighborAny2Regret_w1_1	10.86 (3 - 26)	12.92 (6 - 27)
SteepestLS_Edges_Random	59.24 (51 - 80)	56.47 (42 - 65)
SteepestLS_Nodes_Random	69.33 (54 - 134)	68.87 (55 - 86)
GreedyLS_Edges_Random	206.46 (180 - 254)	205.24 (172 - 231)
GreedyLS_Nodes_Random	210.28 (173 - 261)	212.09 (167 - 257)
<b>CandidateMoves_k10_Edges_NearestNeighborAny2Regret_w1_1</b>	4.01 (3 - 5)	4.17 (3 - 5)
<b>CandidateMoves_k10_Edges_Random</b>	7.31 (6 - 12)	7.10 (6 - 10)
<b>CandidateMoves_k10_Nodes_NearestNeighborAny2Regret_w1_1</b>	4.14 (3 - 14)	4.12 (3 - 5)
<b>CandidateMoves_k10_Nodes_Random</b>	8.62 (6 - 46)	8.41 (7 - 11)

## 2D Visualization of Best Solution

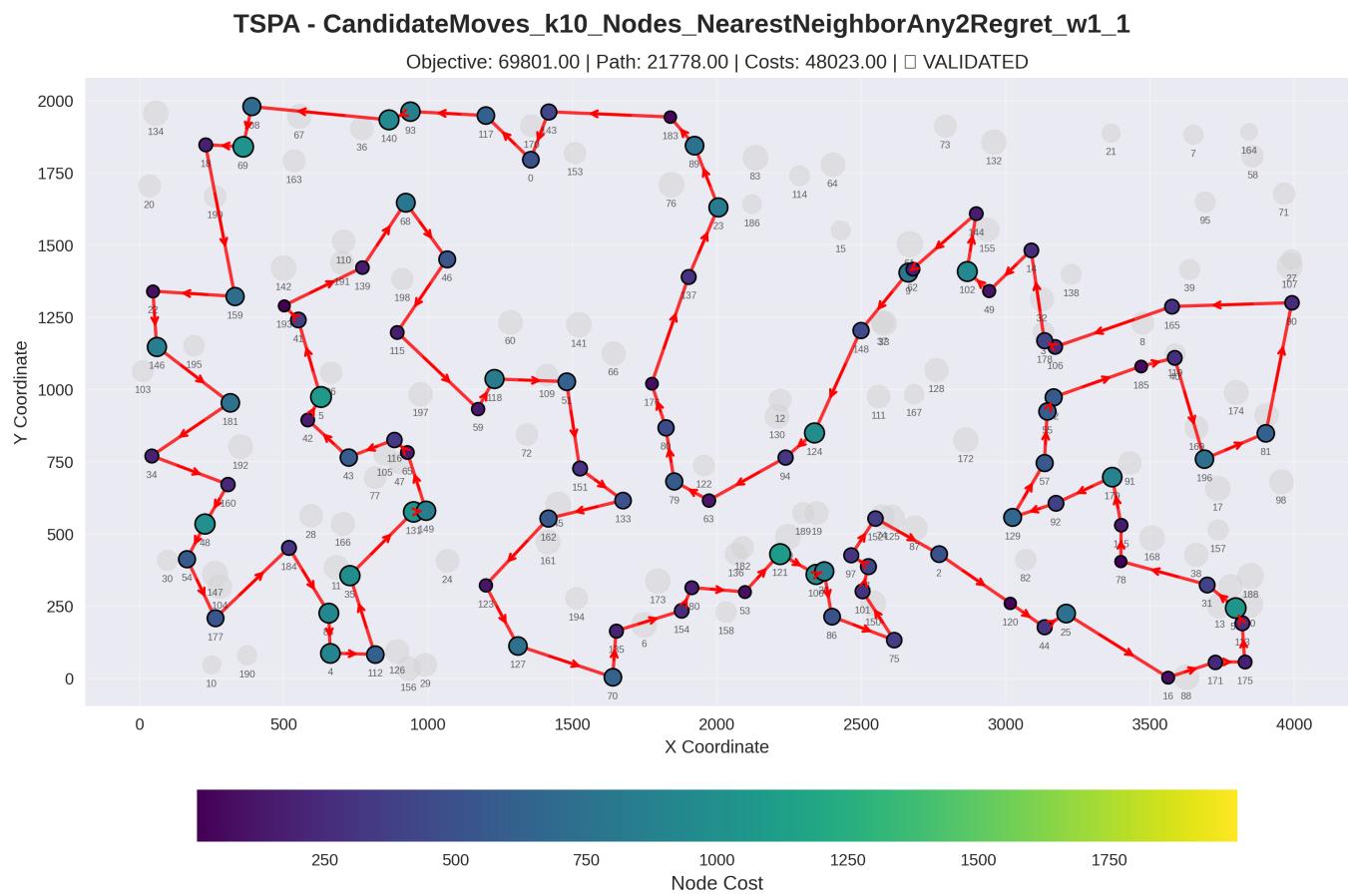
Instance: TSPA

## CandidateMoves\_k10\_Edges\_NearestNeighborAny2Regret\_w1\_1



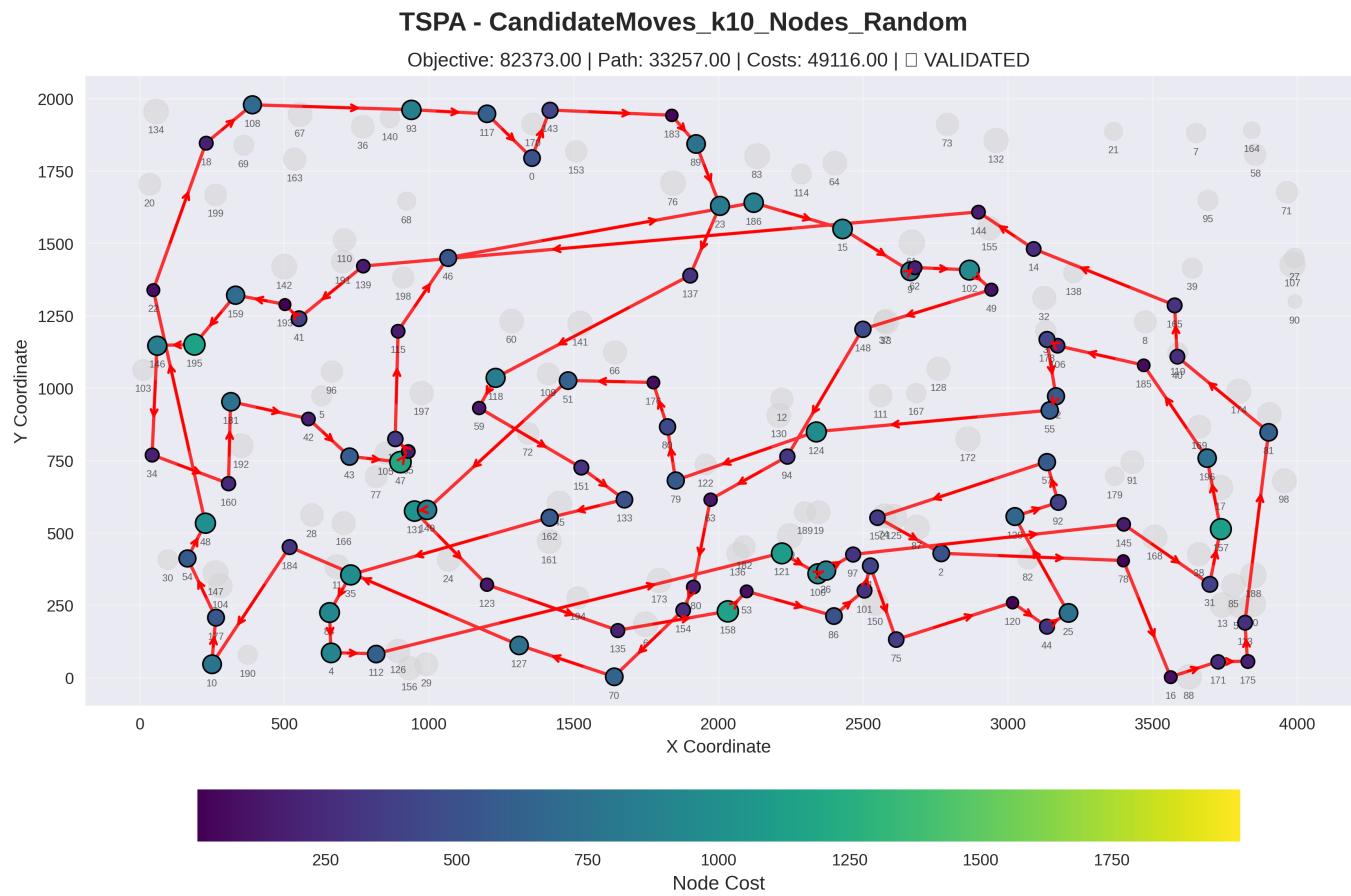
**Node Order (Route):** 2, 129, 57, 92, 120, 44, 25, 16, 171, 175, 113, 56, 31, 78, 145, 179, 196, 81, 90, 165, 40, 185, 55, 52, 106, 178, 49, 14, 144, 102, 62, 9, 148, 15, 114, 186, 137, 23, 89, 183, 143, 0, 117, 93, 140, 68, 46, 115, 139, 41, 193, 159, 69, 108, 18, 22, 146, 181, 34, 160, 48, 54, 177, 10, 190, 4, 112, 84, 35, 184, 42, 43, 116, 65, 59, 118, 51, 176, 80, 94, 63, 79, 133, 151, 162, 123, 127, 70, 135, 154, 180, 53, 86, 100, 26, 97, 152, 1, 101, 75

## CandidateMoves\_k10\_Nodes\_NearestNeighborAny2Regret\_w1\_1



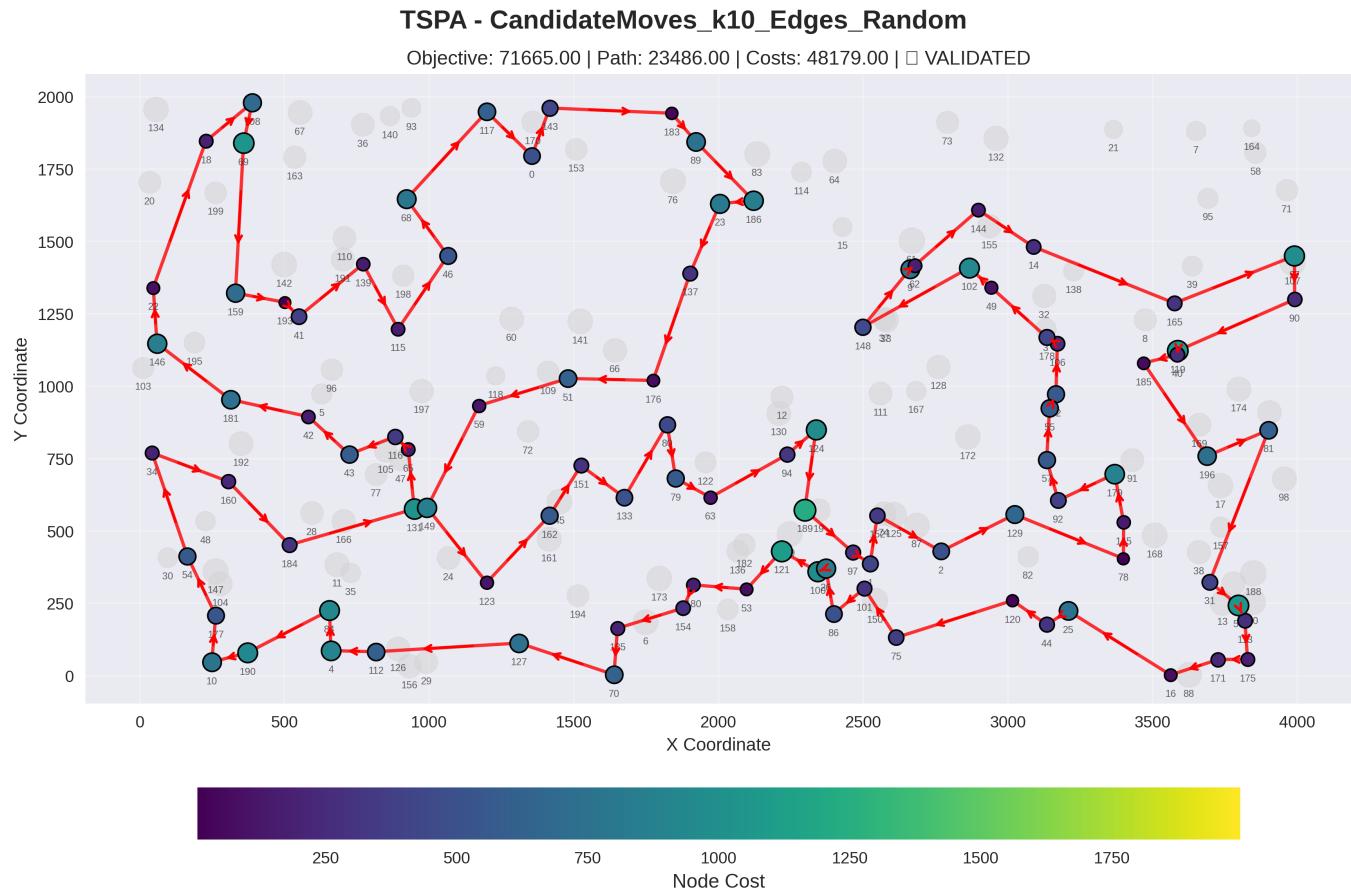
**Node Order (Route):** 108, 69, 18, 159, 22, 146, 181, 34, 160, 48, 54, 177, 184, 84, 4, 112, 35, 131, 149, 65, 116, 43, 42, 5, 41, 193, 139, 68, 46, 115, 59, 118, 51, 151, 133, 162, 123, 127, 70, 135, 154, 180, 53, 121, 100, 26, 86, 75, 101, 1, 97, 152, 2, 120, 44, 25, 16, 171, 175, 113, 56, 31, 78, 145, 179, 92, 129, 57, 55, 52, 185, 40, 196, 81, 90, 165, 106, 178, 14, 49, 102, 144, 62, 9, 148, 124, 94, 63, 79, 80, 176, 137, 23, 89, 183, 143, 0, 117, 93, 140

### CandidateMoves\_k10\_Nodes\_Random



**Node Order (Route):** 117, 0, 143, 183, 89, 23, 137, 118, 59, 151, 133, 162, 35, 84, 4, 112, 121, 100, 26, 97, 145, 31, 157, 196, 185, 106, 178, 52, 55, 124, 79, 80, 176, 51, 149, 131, 123, 135, 158, 53, 86, 101, 1, 75, 120, 44, 25, 129, 92, 57, 152, 2, 78, 16, 171, 175, 113, 81, 40, 165, 14, 144, 139, 41, 193, 159, 195, 146, 34, 160, 181, 42, 43, 47, 65, 116, 115, 46, 186, 15, 9, 62, 102, 49, 148, 94, 63, 180, 154, 70, 127, 184, 10, 177, 54, 48, 22, 18, 108, 93

### CandidateMoves\_k10\_Edges\_Random

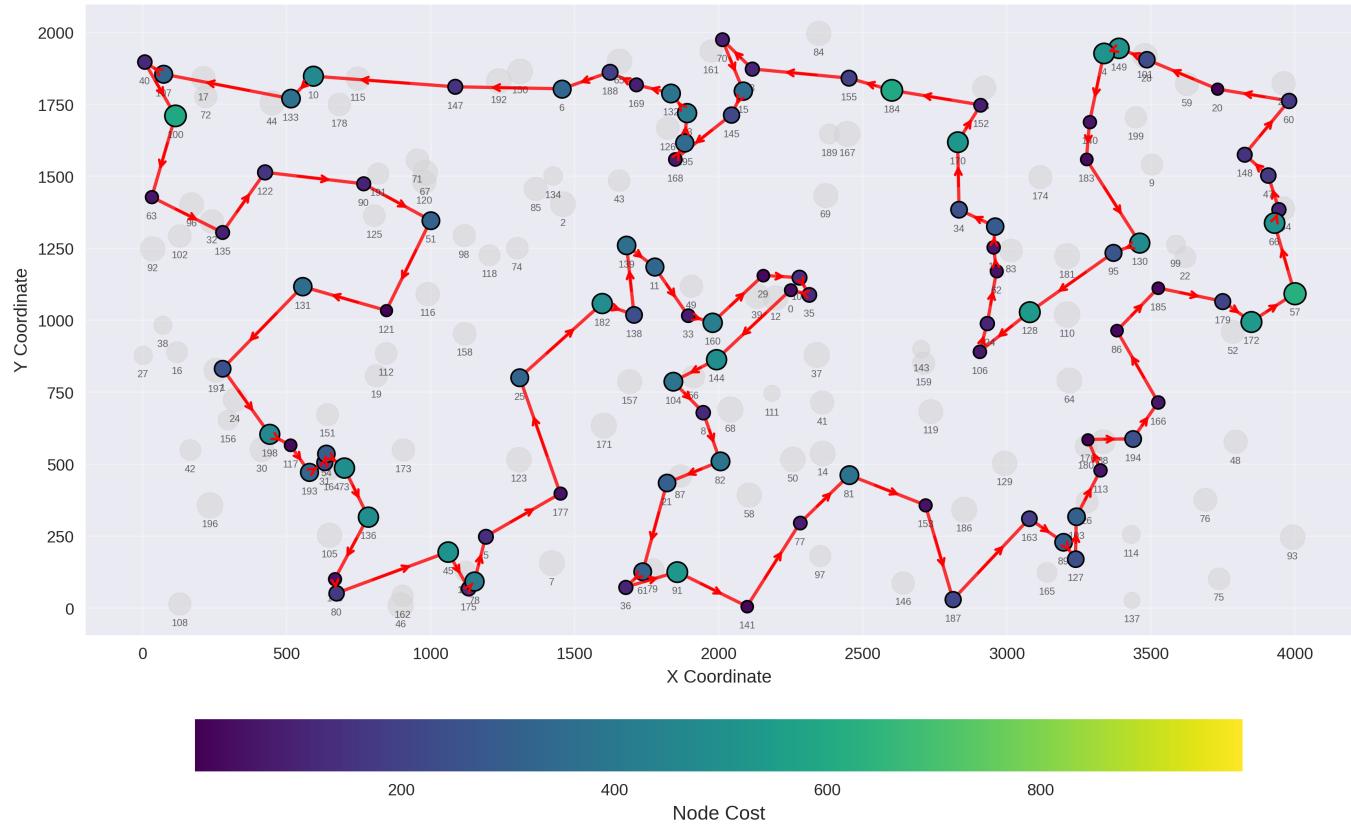


Instance: TSPB

[CandidateMoves\\_k10\\_Edges\\_NearestNeighborAny2Regret\\_w1\\_1](#)

**TSPB - CandidateMoves\_k10\_Edges\_NearestNeighborAny2Regret\_w1\_1**

Objective: 44378.00 | Path: 19929.00 | Costs: 24449.00 | □ VALIDATED

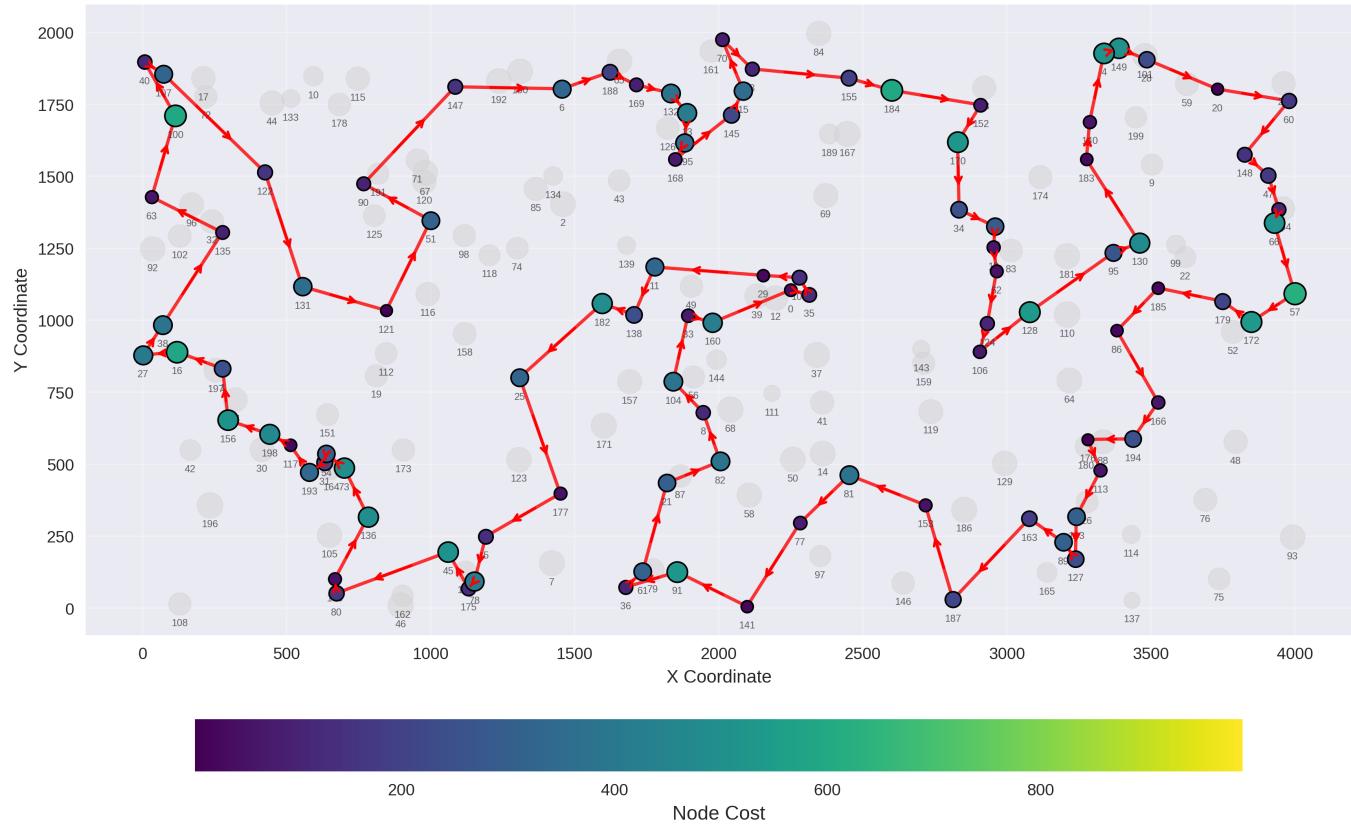


**Node Order (Route):** 10, 133, 107, 40, 100, 63, 135, 122, 90, 51, 121, 131, 1, 198, 117, 193, 31, 54, 73, 136, 190, 80, 45, 175, 78, 5, 177, 25, 182, 138, 139, 11, 33, 160, 29, 109, 35, 0, 144, 104, 8, 82, 21, 61, 36, 91, 141, 77, 81, 153, 187, 163, 89, 127, 103, 113, 176, 194, 166, 86, 185, 179, 172, 57, 66, 94, 47, 148, 60, 20, 28, 149, 4, 140, 183, 130, 95, 128, 106, 124, 62, 18, 55, 34, 170, 152, 184, 155, 3, 70, 15, 145, 168, 195, 13, 132, 169, 188, 6, 147

**CandidateMoves\_k10\_Nodes\_NearestNeighborAny2Regret\_w1\_1**

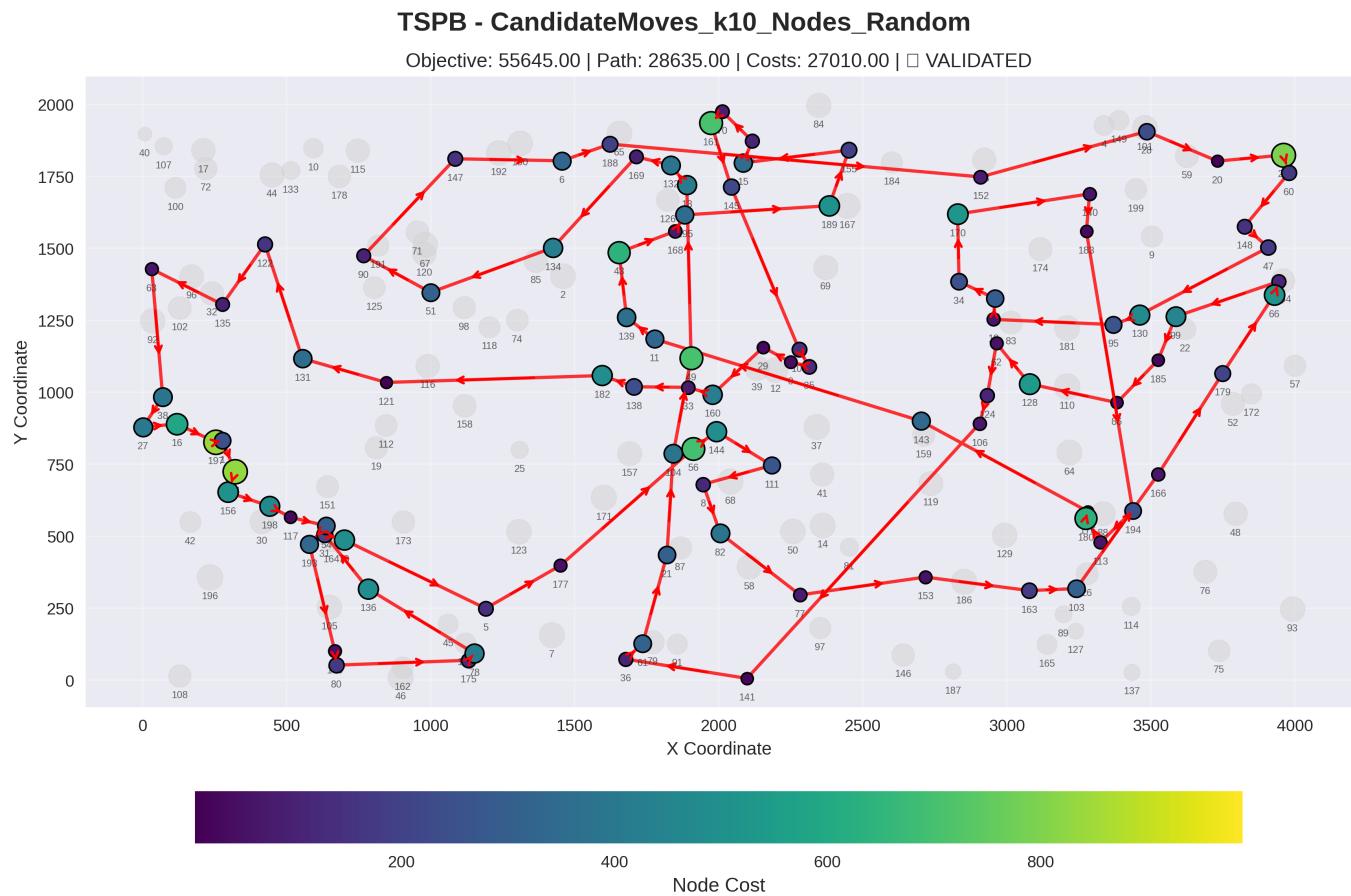
### TSPB - CandidateMoves\_k10\_Nodes\_NearestNeighborAny2Regret\_w1\_1

Objective: 44488.00 | Path: 19854.00 | Costs: 24634.00 |  VALIDATED



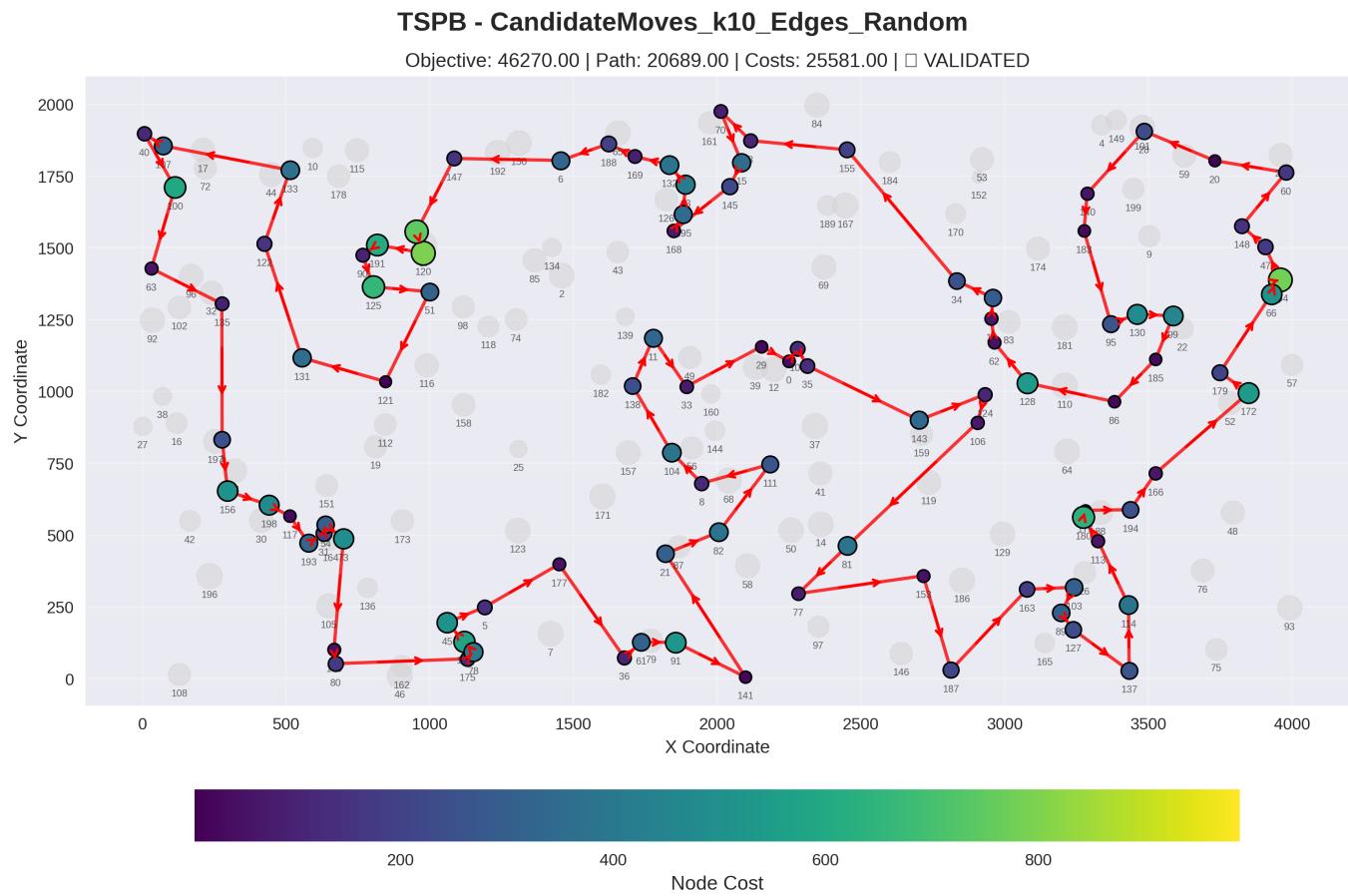
**Node Order (Route):** 131, 121, 51, 90, 147, 6, 188, 169, 132, 13, 195, 168, 145, 15, 70, 3, 155, 184, 152, 170, 34, 55, 18, 62, 124, 106, 128, 95, 130, 183, 140, 4, 149, 28, 20, 60, 148, 47, 94, 66, 57, 172, 179, 185, 86, 166, 194, 176, 113, 103, 127, 89, 163, 187, 153, 81, 77, 141, 91, 36, 61, 21, 82, 8, 104, 33, 160, 0, 35, 109, 29, 11, 138, 182, 25, 177, 5, 78, 175, 45, 80, 190, 136, 73, 54, 31, 193, 117, 198, 156, 1, 16, 27, 38, 135, 63, 100, 40, 107, 122

### CandidateMoves\_k10\_Nodes\_Random



**Node Order (Route):** 24, 156, 198, 117, 54, 193, 190, 80, 175, 78, 136, 31, 73, 5, 177, 56, 144, 111, 8, 82, 77, 153, 163, 103, 166, 179, 66, 94, 99, 185, 86, 128, 62, 124, 106, 141, 36, 61, 21, 104, 49, 13, 132, 169, 134, 51, 90, 147, 6, 188, 152, 28, 20, 23, 60, 148, 47, 130, 95, 18, 55, 34, 170, 140, 183, 194, 113, 180, 176, 143, 11, 139, 43, 168, 195, 189, 155, 15, 3, 70, 161, 145, 109, 35, 0, 29, 160, 33, 138, 182, 121, 131, 122, 135, 63, 38, 27, 16, 197, 1

### CandidateMoves\_k10\_Edges\_Random



**Node Order (Route):** 185, 86, 128, 62, 18, 55, 34, 155, 3, 70, 15, 145, 168, 195, 13, 132, 169, 188, 6, 147, 71, 120, 191, 90, 125, 51, 121, 131, 122, 133, 107, 40, 100, 63, 135, 1, 156, 198, 117, 193, 31, 54, 73, 190, 80, 175, 78, 142, 45, 5, 177, 36, 61, 91, 141, 21, 82, 111, 8, 104, 138, 11, 33, 29, 0, 109, 35, 143, 124, 106, 81, 77, 153, 187, 163, 103, 89, 127, 137, 114, 113, 180, 176, 194, 166, 172, 179, 66, 94, 154, 47, 148, 60, 20, 28, 140, 183, 95, 130, 99

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## Conclusions

### Key Findings

### Performance Comparison

### Observations