

Assignment 3

Runar Fosse

Implementation of 1-insert: From all calls I choose one random to move. This call will either be outsourced, or moved to a different, random vehicle which preserves feasibility (calls will not be moved to vehicle's which can't take it). The insertion indices in the new vehicle is random.

Instance: Call_7_Vehicle_3				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	1410480.20	1134176.00	65.022906 %	1.646 s
Local Search 1-insert	1225532.80	1134176.00	65.022906 %	0.336 s
Simulated Annealing 1-insert	1134176.00	1134176.00	65.022906 %	0.267 s
Best solution: [4, 4, 2, 2, 0, 7, 7, 0, 1, 5, 5, 3, 3, 1, 0, 6, 6]				

Instance: Call_18_Vehicle_5				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	5823937.20	4813395.00	46.277767 %	0.992 s
Local Search 1-insert	2826767.30	2374420.00	73.499132 %	0.450 s
Simulated Annealing 1-insert	2602245.20	2374420.00	73.499132 %	0.441 s
Best solution: [4, 4, 15, 15, 11, 11, 16, 16, 0, 6, 6, 5, 18, 5, 14, 17, 17, 14, 18, 0, 9, 8, 8, 9, 13, 13, 0, 7, 7, 3, 3, 10, 1, 10, 1, 0, 12, 12, 0, 2, 2]				

Instance: Call_35_Vehicle_7				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	17986369.00	14373301.00	21.832494 %	1.208 s
Local Search 1-insert	7181838.70	6076993.00	66.950989 %	0.583 s
Simulated Annealing 1-insert	5710323.50	5208574.00	71.673783 %	0.637 s
Best solution: [4, 4, 23, 23, 11, 11, 7, 7, 21, 21, 0, 9, 12, 9, 35, 35, 10, 12, 10, 28, 28, 0, 19, 19, 24, 24, 13, 13, 25, 25, 31, 31, 0, 15, 34, 15, 30, 30, 27, 27, 34, 22, 22, 32, 32, 20, 20, 0, 8, 8, 18, 33, 18, 33, 5, 5, 2, 29, 29, 2, 0, 16, 16, 3, 3, 1, 26, 1, 26, 0, 14, 14, 17, 17, 0, 6, 6]				

Instance: Call_80_Vehicle_20				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	46770347.00	46770347.00	0.000000 %	2.235 s
Local Search 1-insert	16717960.80	14829767.00	68.292373 %	2.534 s
Simulated Annealing 1-insert	17164938.80	14732724.00	68.499862 %	2.576 s
Best solution: [32, 32, 35, 42, 35, 42, 80, 80, 7, 7, 0, 21, 51, 51, 44, 44, 21, 0, 70, 70, 62, 62, 20, 20, 0, 30, 1, 30, 1, 65, 65, 77, 77, 0, 74, 67, 67, 74, 50, 50, 0, 54, 63, 63, 54, 27, 27, 0, 4, 4, 71, 71, 69, 58, 69, 58, 0, 40, 29, 40, 29, 5, 5, 17, 17, 0, 53, 11, 11, 55, 55, 53, 0, 8, 8, 49, 49, 16, 16, 10, 10, 0, 41, 23, 23, 61, 61, 41, 26, 26, 73, 73, 0, 68, 9, 68, 9, 28, 28, 14, 14, 0, 25, 25, 43, 43, 2, 2, 56, 56, 6, 6, 0, 57, 37, 57, 31, 37, 31, 0, 15, 34, 15, 79, 34, 19, 19, 79, 0, 13, 13, 3, 36, 3, 24, 24, 36, 0, 66, 66, 33, 33, 0, 38, 38, 59, 46, 12, 59, 72, 12, 72, 46, 0, 76, 76, 75, 75, 52, 52, 0, 60, 18, 60, 18, 48, 48, 47, 47, 0, 22, 22, 39, 39, 45, 45, 64, 64, 78, 78]				

Instance: Call_130_Vehicle_40				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	76627567.00	76627567.00	0.000000 %	3.671 s
Local Search 1-insert	27005805.00	24953712.00	67.435072 %	7.316 s
Simulated Annealing 1-insert	27155019.30	24305693.00	68.280745 %	6.171 s
Best solution: [15, 15, 16, 16, 82, 82, 125, 56, 125, 56, 77, 77, 0, 5, 95, 5, 95, 104, 104, 0, 105, 105, 55, 109, 109, 55, 0, 126, 126, 63, 63, 39, 39, 0, 74, 74, 92, 92, 127, 127, 14, 14, 0, 58, 40, 58, 40, 0, 11, 11, 89, 111, 89, 111, 0, 73, 62, 62, 81, 46, 81, 73, 53, 46, 53, 0, 106, 41, 41, 23, 23, 122, 106, 122, 0, 21, 69, 69, 21, 91, 94, 94, 91, 64, 64, 0, 3, 3, 50, 1, 50, 1, 0, 84, 84, 18, 18, 0, 25, 25, 65, 65, 51, 51, 0, 60, 60, 102, 102, 107, 107, 7, 7, 30, 30, 0, 80, 80, 118, 118, 83, 83, 0, 42, 98, 98, 96, 42, 96, 26, 26, 0, 121, 121, 22, 22, 0, 88, 88, 35, 101, 35, 36, 101, 10, 10, 36, 0, 124, 124, 59, 59, 0, 54, 54, 112, 112, 12, 12, 0, 44, 27, 27, 97, 97, 44, 0, 123, 32, 123, 99, 32, 99, 28, 28, 0, 49, 49, 108, 108, 0, 114, 29, 29, 114, 13, 13, 0, 19, 19, 45, 45, 71, 71, 0, 8, 8, 78, 78, 57, 57, 0, 38, 38, 34, 9, 34, 17, 17, 9, 0, 103, 103, 0, 52, 52, 0, 110, 68, 110, 68, 0, 4, 4, 31, 31, 0, 100, 100, 119, 70, 119, 70, 20, 20, 0, 75, 75, 47, 47, 0, 116, 37, 116, 76, 76, 37, 0, 66, 66, 0, 130, 67, 61, 67, 130, 61, 43, 43, 128, 128, 0, 117, 117, 0, 120, 79, 120, 48, 48, 79, 0, 93, 93, 24, 24, 0, 86, 86, 113, 90, 90, 113, 0, 2, 2, 6, 6, 33, 33, 72, 72, 85, 85, 87, 87, 115, 115, 129, 129]				

Instance: Call_300_Vehicle_90				
	Average objective	Best objective	Improvement (%)	Running time
Random Search	170784643.00	170784643.00	0.000000 %	8.944 s
Local Search 1-insert	71054331.20	67580835.00	60.429208 %	24.332 s
Simulated Annealing 1-insert	71107759.80	67246387.00	60.625039 %	23.887 s
Best solution: [213, 95, 95, 213, 0, 29, 29, 108, 108, 0, 105, 105, 74, 148, 74, 148, 0, 253, 253, 18, 18, 0, 233, 233, 235, 235, 27, 27, 0, 263, 14, 14, 263, 0, 269, 269, 228, 228, 0, 280, 280, 11, 11, 0, 37, 155, 155, 185, 37, 185, 231, 231, 0, 25, 25, 271, 271, 0, 41, 41, 209, 209, 73, 73, 0, 273, 273, 0, 32, 32, 298, 298, 0, 89, 63, 63, 89, 0, 65, 288, 288, 65, 0, 68, 68, 176, 176, 58, 58, 0, 279, 279, 125, 125, 0, 10, 10, 9, 157, 157, 9, 0, 272, 272, 51, 51, 130, 130, 0, 83, 83, 5, 5, 0, 46, 53, 46, 59, 59, 53, 0, 270, 277, 98, 277, 98, 270, 292, 292, 0, 82, 136, 82, 136, 189, 189, 0, 26, 26, 0, 80, 80, 106, 106, 0, 36, 246, 36, 246, 90, 146, 146, 90, 0, 181, 181, 112, 112, 0, 201, 67, 67, 144, 144, 201, 113, 113, 0, 171, 114, 254, 171, 114, 173, 254, 173, 0, 300, 300, 289, 289, 0, 109, 109, 119, 119, 70, 70, 117, 117, 0, 249, 249, 151, 151, 177, 177, 267, 267, 0, 122, 122, 22, 22, 0, 54, 54, 203, 153, 153, 203, 0, 141, 196, 141, 196, 0, 215, 215, 118, 118, 79, 79, 165, 165, 0, 40, 40, 283, 283, 0, 168, 168, 88, 88, 97, 97, 0, 134, 134, 234, 234, 282, 282, 0, 23, 23, 21, 21, 0, 188, 188, 194, 293, 293, 194, 28, 28, 115, 115, 0, 206, 286, 286, 206, 12, 12, 0, 152, 126, 126, 152, 187, 198, 17, 17, 198, 187, 0, 218, 218, 204, 204, 186, 186, 0, 211, 266, 211, 139, 266, 139, 0, 164, 290, 164, 290, 0, 111, 111, 33, 33, 0, 96, 96, 121, 212, 121, 124, 124, 212, 34, 34, 20, 20, 0, 182, 42, 182, 42, 102, 102, 0, 45, 45, 227, 227, 166, 166, 140, 140, 0, 133, 133, 237, 237, 0, 245, 245, 81, 199, 81, 199, 0, 217, 217, 64, 64, 226, 226, 0, 205, 205, 129, 129, 0, 232, 94, 232, 94, 3, 50, 3, 50, 0, 1, 224, 224, 1, 104, 104, 0, 295, 250, 250, 295, 4, 4, 84, 84, 0, 77, 268, 268, 77, 56, 101, 56, 101, 0, 208, 48, 208, 48, 62, 62, 262, 262, 99, 99, 0, 92, 92, 256, 256, 100, 100, 0, 261, 261, 0, 180, 180, 163, 258, 258, 163, 0, 247, 247, 72, 184, 184, 72, 0, 169, 291, 169, 170, 170, 291, 0, 200, 149, 200, 191, 149, 197, 197, 191, 0, 143, 143, 243, 243, 38, 38, 0, 214, 24, 214, 24, 120, 120, 8, 8, 0, 179, 179, 230, 230, 47, 47, 0, 265, 265, 255, 255, 0, 159, 91, 159, 251, 91, 251, 0, 202, 202, 0, 241, 87, 87, 259, 259, 241, 0, 86, 210, 86, 285, 297, 210, 297, 285, 0, 6, 6, 107, 107, 190, 190, 0, 193, 294, 294, 193, 2, 2, 0, 178, 178, 236, 52, 236, 52, 0, 183, 30, 30, 183, 296, 296, 0, 31, 31, 275, 55, 55, 275, 0, 223, 257, 257, 223, 0, 174, 174, 16, 16, 252, 252, 0, 274, 220, 220, 274, 192, 192, 0, 239, 44, 44, 239, 85, 85, 93, 93, 0, 43, 284, 43, 284, 132, 132, 0, 116, 219, 116, 219, 13, 13, 0, 103, 103, 131, 131, 0, 150, 7, 150, 7, 0, 78, 78, 49, 127, 127, 60, 60, 49, 0, 207, 260, 207, 260, 0, 158, 158, 175, 175, 0, 244, 244, 216, 216, 0, 15, 15, 19, 19, 35, 35, 39, 39, 57, 57, 61, 61, 66, 66, 69, 69, 71, 71, 75, 75, 76, 76, 110, 110, 123, 123, 128, 128, 135, 135, 137, 137, 138, 138, 142, 142, 145, 145, 147, 147, 154, 154, 156, 156, 160, 160, 161, 161, 162, 162, 167, 167, 172, 172, 195, 195, 221, 221, 222, 222, 225, 225, 229, 229, 238, 238, 240, 240, 242, 242, 248, 248, 264, 264, 276, 276, 278, 278, 281, 281, 287, 287, 299, 299]				