Results

Call\_7\_Vehicle\_3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 2736946.08 | 2043429.0 | 15.04% | 22s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 | Program still running | Program still running | Program still running | Program still running |
| SA Equal | 1646087.5 | 1503756.0 | 53.6% | 39s |
| SA Tuned | 1479803.7 | 1271339.0 | 60,8% | 46s |

Top solution: [4, 4, 7, 7, 0, 5, 5, 3, 3, 0, 1, 1, 2, 2, 0, 6, 6]

Call\_18\_Vehicle\_5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 8037526.54 | 6981644.0 | 16.91% | 35s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 |  |  |  |  |
| SA Equal | 5200481.6 | 4911302.0 | 45.2% | 80s |
| SA Tuned | 5129215.1 | 4928032.0 | 45% | 80s |

Top solution: [18, 18, 13, 13, 0, 7, 4, 4, 7, 14, 14, 0, 15, 15, 0, 5, 5, 12, 12, 0, 10, 1, 10, 1, 0, 17, 8, 6, 3, 11, 8, 11, 17, 16, 9, 9, 6, 2, 2, 16, 3]

Call\_35\_Vehicle\_7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 17115489.6 | 16185612.0 | 7.87% | 57s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 |  |  |  |  |
| SA Equal | 12446075.6 | 12042049.0 | 34.5% | 95s |
| SA Tuned | 12578740.9 | 12035786.0 | 34.5% | 102s |

Top solution: [15, 15, 0, 30, 30, 10, 10, 28, 28, 0, 14, 14, 35, 35, 32, 32, 31, 31, 0, 19, 19, 33, 33, 22, 22, 0, 6, 6, 5, 5, 0, 1, 7, 7, 18, 18, 1, 0, 17, 17, 0, 3, 20, 4, 34, 23, 26, 11, 13, 25, 21, 9, 20, 21, 24, 27, 9, 8, 12, 2, 23, 16, 16, 26, 2, 25, 8, 24, 27, 13, 11, 34, 29, 29, 4, 12, 3]

Call\_80\_Vehicle\_20

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 44606107.5 | 43904827.0 | 3.83% | 212s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 |  |  |  |  |
| SA Equal | 28679000.1 | 27269241.0 | 41.7% | 272s |
| SA Tuned | 29142478.1 | 27006484.0 | 42.3% | 316s |

Top solution: [25, 25, 26, 26, 0, 18, 44, 44, 18, 0, 70, 70, 73, 73, 0, 0, 74, 46, 46, 74, 0, 8, 8, 65, 65, 27, 27, 0, 11, 11, 48, 17, 17, 48, 0, 9, 12, 9, 12, 0, 53, 1, 53, 1, 69, 69, 10, 10, 0, 32, 32, 55, 55, 50, 50, 0, 68, 68, 14, 14, 0, 49, 49, 0, 62, 62, 78, 78, 0, 57, 37, 57, 24, 37, 24, 0, 22, 22, 42, 72, 42, 72, 0, 23, 23, 59, 59, 67, 67, 0, 66, 66, 58, 58, 6, 6, 0, 38, 38, 80, 80, 0, 76, 76, 36, 36, 0, 13, 79, 13, 77, 77, 79, 0, 3, 19, 60, 20, 16, 19, 5, 15, 33, 4, 39, 34, 60, 33, 75, 47, 30, 52, 63, 28, 30, 15, 54, 45, 64, 34, 71, 29, 43, 16, 21, 31, 40, 7, 52, 56, 63, 7, 2, 54, 51, 35, 56, 40, 31, 41, 29, 64, 61, 39, 61, 3, 2, 43, 20, 21, 45, 4, 51, 75, 35, 5, 71, 28, 41, 47]

Call\_130\_Vehicle\_40

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 74237374.0 | 73003108.0 | 3.27% | 680s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 |  |  |  |  |
| SA Equal | 43988698.5 | 41383362.0 | 46% | 593s |
| SA Tuned | 44837640.9 | 42575165.0 | 44% | 607s |

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

Call\_300\_Vehicle\_90

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average | Best | Improvement | Runtime |
| Random Search | 84987543.0 | 84987543.0 | 0% | 4200s |
| LS-1 |  |  |  |  |
| LS-2 |  |  |  |  |
| LS-3 |  |  |  |  |
| SA-1 |  |  |  |  |
| SA-2 |  |  |  |  |
| SA-3 |  |  |  |  |
| SA Equal | 105115234.3 | 99126143.0 | 42% | 1710s |
| SA Tuned | 104643904.6 | 99736321.0 | 41.6% | 1192s |

Operators

Operator one is ‘reassign\_call()’. It selects a random call from all calls, and randomly selects a new vehicle to assign it to or moves the call to the dummy vehicle. (Referred to in code as ‘retiring’ the call).

Operator two is ‘reorder\_vehicle\_calls()’. It randomly selects a vehicle of which calls should be rearranged. The vehicle in question must handle more than one call. It selects a call handled by the selected vehicle at random and reinserts the call in a new position.

Operator three is ‘assign\_all\_retireds()’. While the other two operators give us neighboring solutions that are close to our original solution, the idea of this one was to move us far away from our original solution in the solution space. It removes all calls from the dummy vehicle, and randomly assigns them to new vehicles.