隨機貪婪策略：

貪婪：尋找離目前城市最近的城市

隨機：隨機找一個城市

策略：設定機率p，在決定下一個城市時，有(1-p)的機率使用貪婪策略，有p的機率使用隨機策略，並迭代一萬次，每次迭代開始時隨機選擇不同的城市當起始點。

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| P = 0.02、iteration = 100000 |
| total distance: [7840.82526498]  [30 23 20 50 16 44 34 35 36 39 40 38 37 46 48 24 5 15 6 4 25 12 28 27  26 47 13 14 52 11 51 33 43 10 9 8 41 19 45 32 49 1 22 31 18 3 17 21  42 7 2 29 30] |
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| P = 0.05、iteration = 100000 |
| total distance: [7822.17054943]  [50 20 23 31 18 22 1 49 32 36 35 40 38 37 39 34 44 46 48 24 5 15 6 4  25 12 28 27 26 47 13 14 52 11 51 33 43 10 9 8 41 19 45 3 17 21 7 2  42 30 29 16 50] |
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| --- |
| P = 0.1、iteration = 100000 |
| [7890.97828279]  [40 38 37 39 36 35 34 44 46 48 24 5 15 6 4 25 12 28 27 26 47 13 14 52  11 51 33 43 10 9 8 41 19 45 32 49 1 22 31 18 3 17 21 42 7 2 30 23  20 50 16 29 40] |
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GA

策略：將所有子代中的第一名當作父、第二名當作母，將母的隨機片段DNA取代在父的隨機片段(DNA片段長度: dna\_slice\_amount)，讓父同時保留自身優勢、又同時擁有母的優良基因，以此策略製作子代，最後再將父與母重新放回子代繼續繁衍。

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| Iteration = 100K、population = 10、dna\_slice\_amount = 8 |
| [ 7 2 42 17 3 18 22 49 39 40 48 24 38 36 35 32 45 19 41 8 9 10 43 33  51 27 28 26 47 46 44 16 29 30 20 50 23 21 31 1 34 37 5 6 15 4 25 12  11 14 13 52]  Distance = 8758 |
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| Iteration = 100K、population = 30、dna\_slice\_amount = 8 |
| [17 18 3 45 19 41 8 9 10 43 33 51 11 13 14 47 26 28 12 25 4 6 15 5  24 48 38 37 40 39 36 49 32 22 31 21 42 7 2 30 29 16 50 20 23 1 35 34  44 46 27 52]  total distance: [8336.70998437] |
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| Iteration = 100K、population = 10、dna\_slice\_amount = 24 |
| [ 3 17 21 42 7 2 30 18 31 22 1 39 35 36 34 44 16 29 50 20 23 49 32 45  19 41 8 9 10 33 43 4 6 15 5 38 40 48 24 37 46 25 12 51 11 14 13 26  47 28 27 52]  total distance: [8503.83923924] |
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| iteration = 100K, population = 10, dna\_slice\_amount = 16 |
| [33 9 10 8 41 19 45 32 49 1 22 23 31 18 3 17 21 42 2 7 30 29 20 50  16 46 44 34 35 36 39 40 5 6 25 24 48 37 38 15 43 4 12 26 13 14 47 27  28 51 11 52]  total distance: [8270.57848599] |
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禁忌搜索法：

策略：

先產生population\_size個路徑，取其中最佳路徑，若此解比歷史最優解更佳則將其設定為歷史最優解，若否則判斷此解是否在禁忌列表中，若有則跳過此解，尋找下一個最好的，直到從此20個路徑找到可使用的解為止，找到後將其加入禁忌列表中，並以此解產生下一組路徑(產生population\_size個路徑)

tb\_size: 禁忌列表大小

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| tb\_size = 20, population = 100 |
| total distance: [7739.93140914]  [21 31 18 17 3 19 41 8 9 10 45 32 49 1 22 34 35 36 39 37 40 38 24 48  5 15 6 4 43 33 51 11 52 14 13 47 26 27 28 12 25 46 44 16 29 50 20 23  30 2 7 42] |
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| --- |
| tb\_size = 30, population = 100 |
| total distance: [7520.80671001]  [43 33 51 11 52 14 13 47 26 27 28 12 25 4 6 5 24 48 38 15 40 37 46 44  16 29 50 20 23 30 7 2 42 21 17 3 18 31 22 1 36 35 34 39 49 32 45 19  41 8 9 10] |
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| tb\_size = 40, population = 100 |
| total distance: [7836.04756209]  [ 7 17 3 18 31 1 22 49 32 45 19 41 8 9 10 43 33 51 11 52 13 14 47 26  27 28 12 25 4 6 5 15 38 24 48 40 39 37 36 35 34 44 46 16 20 50 29 30  23 21 42 2] |
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| --- |
| tb\_size = 20, population = 150 |
| total distance: [7773.89141437]  [31 21 42 7 2 17 3 45 19 41 8 9 10 43 33 51 11 52 14 13 47 26 27 28  12 25 4 6 15 5 24 48 37 40 38 39 36 35 34 44 46 16 29 50 20 30 23 1  49 32 22 18] |
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| tb\_size = 20, population = 200 |
| total distance: [7735.61257623]  [15 6 4 25 12 28 27 26 47 14 13 52 11 51 33 43 10 9 8 41 19 45 3 17  21 2 7 42 30 29 16 50 20 23 31 18 22 1 32 49 35 36 34 44 46 37 39 40  38 48 24 5] |
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| --- |
| tb\_size = 40, population = 200 |
| total distance: [7620.68369789]  [19 41 8 9 10 43 33 51 11 52 13 14 47 26 27 28 12 25 4 6 15 5 24 48  37 38 40 39 36 35 34 44 46 16 29 50 20 23 30 7 2 42 21 31 17 3 18 22  1 49 32 45] |
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