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Artificial Intelligence-13(II)

Contemporary Intelligent Information Technology (CIIT)

Function Minimization

10/08/2018

Task 1.

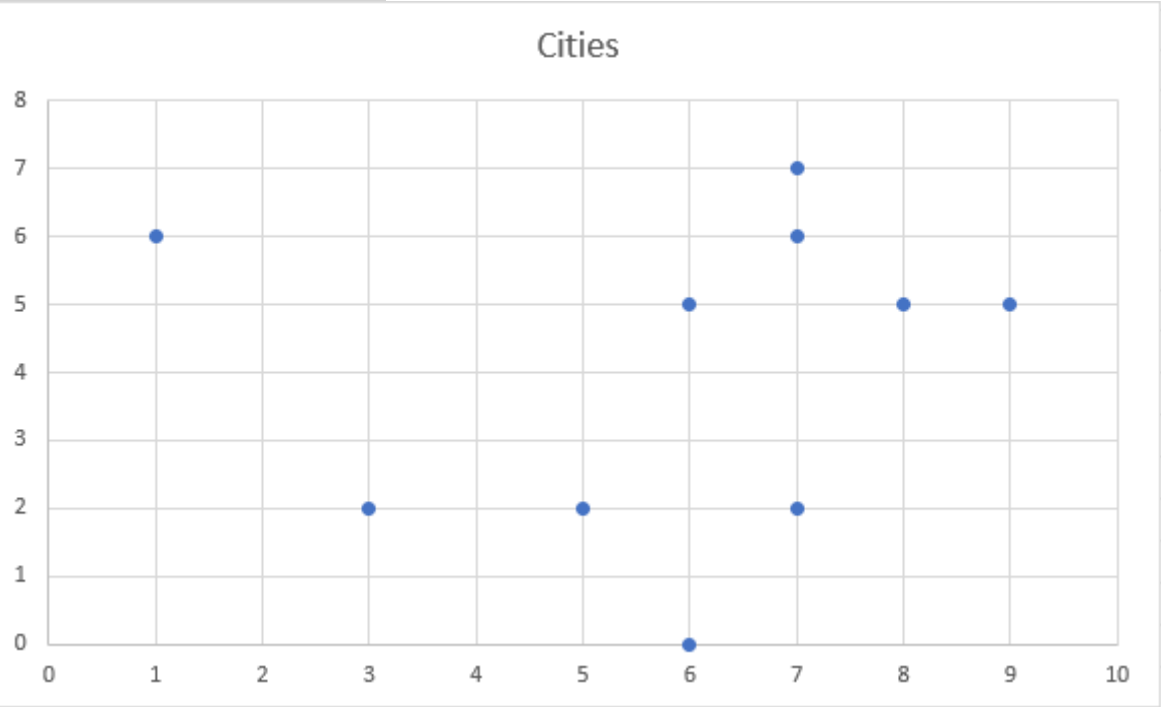
Generate 10 random cities within $x \in [0, 10]$, $y \in [0, 10]$

Distance matrix:

	1	2	3	4	5	6	7	8	9	10
1	0	7,07107	5,38516	6,08276	2,23607	5,83095	3,60555	5	2,23607	7,81025
2	7,07107	0	2,23607	1	5	2,82843	6,40312	2,23607	5,38516	6,08276
3	5,38516	2,23607	0	1,41421	3,16228	1	5,83095	2	4,24264	7,07107
4	6,08276	1	1,41421	0	4	2,23607	5,65685	1,41421	4,47214	6
5	2,23607	5	3,16228	4	0	3,60555	4	3,16228	2	7,2111
6	5,83095	2,82843	1	2,23607	3,60555	0	6,7082	3	5	8,06226
7	3,60555	6,40312	5,83095	5,65685	4	6,7082	0	4,24264	2	4,47214
8	5	2,23607	2	1,41421	3,16228	3	4,24264	0	3,16228	5,09902
9	2,23607	5,38516	4,24264	4,47214	2	5	2	3,16228	0	5,65685
10	7,81025	6,08276	7,07107	6	7,2111	8,06226	4,47214	5,09902	5,65685	0

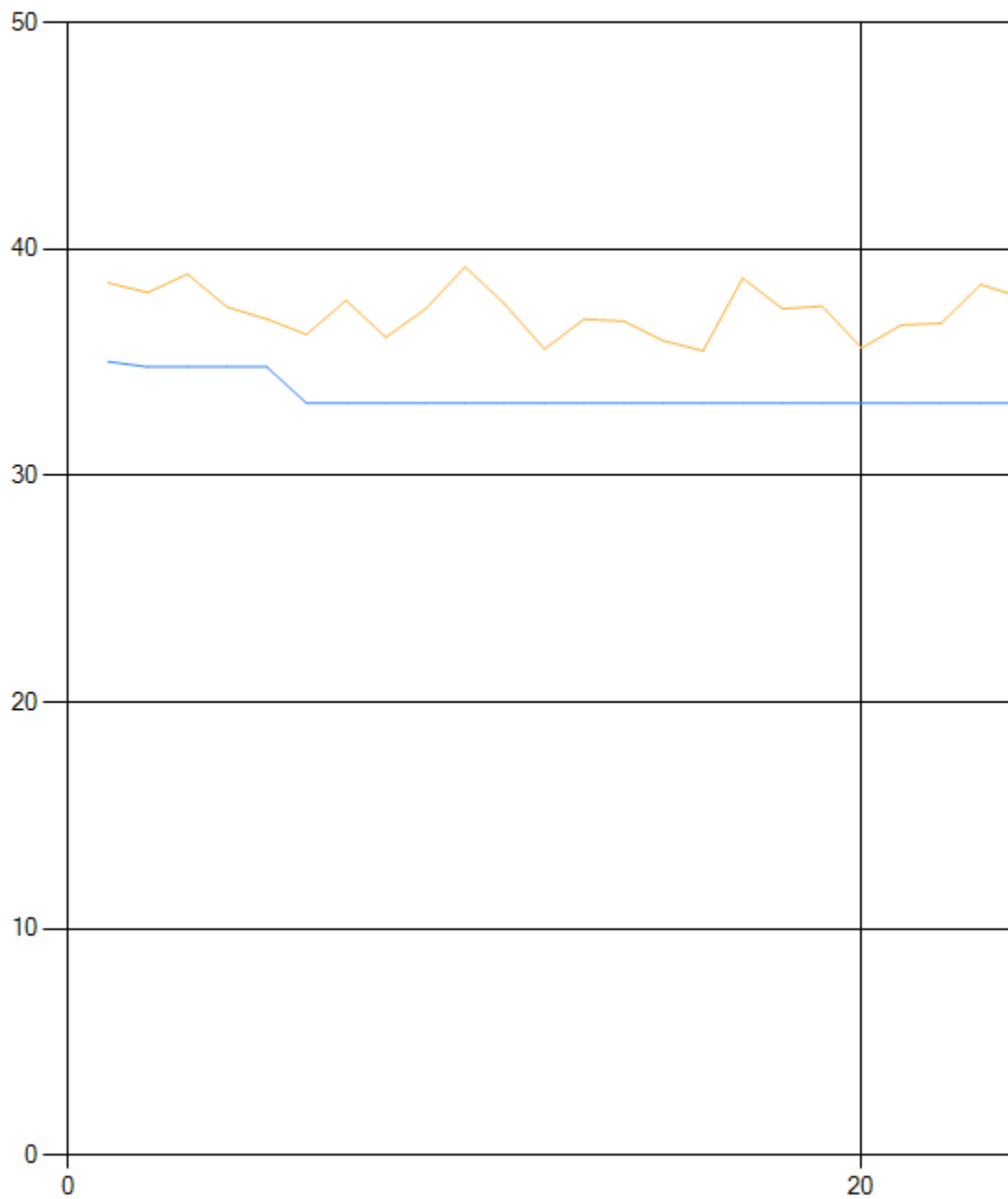
Cities:

	X	Y
1	6	0
2	7	7
3	8	5
4	7	6
5	7	2
6	9	5
7	3	2
8	6	5
9	5	2
10	1	6



population size - 10

chromosome size - 9



The **X** axis describes generation number, the **Y** axis describes fitness.

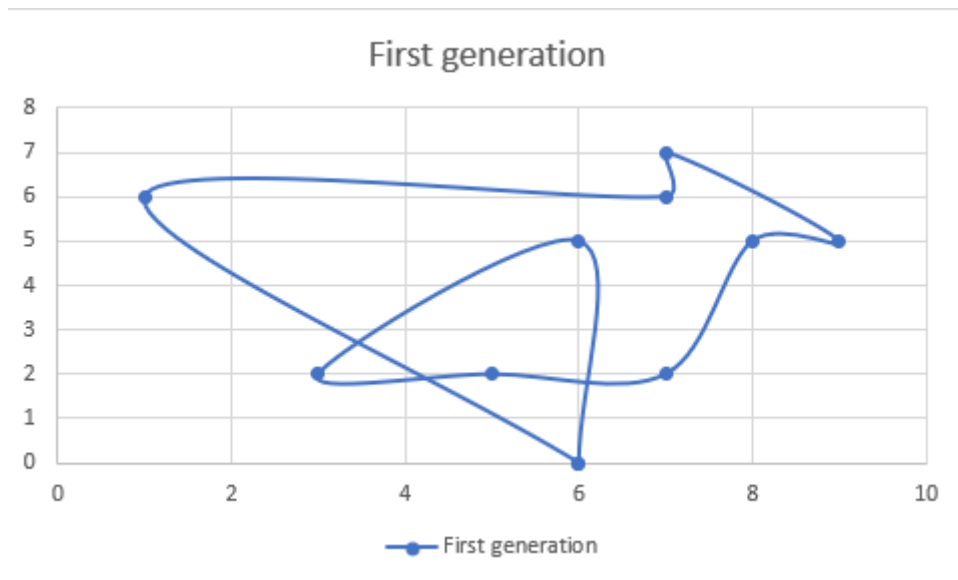
Blue line – the best fitness in generation

Orange line – average fitness

First generation path:

1	10	4	2	6	3	5	9	7	8	1
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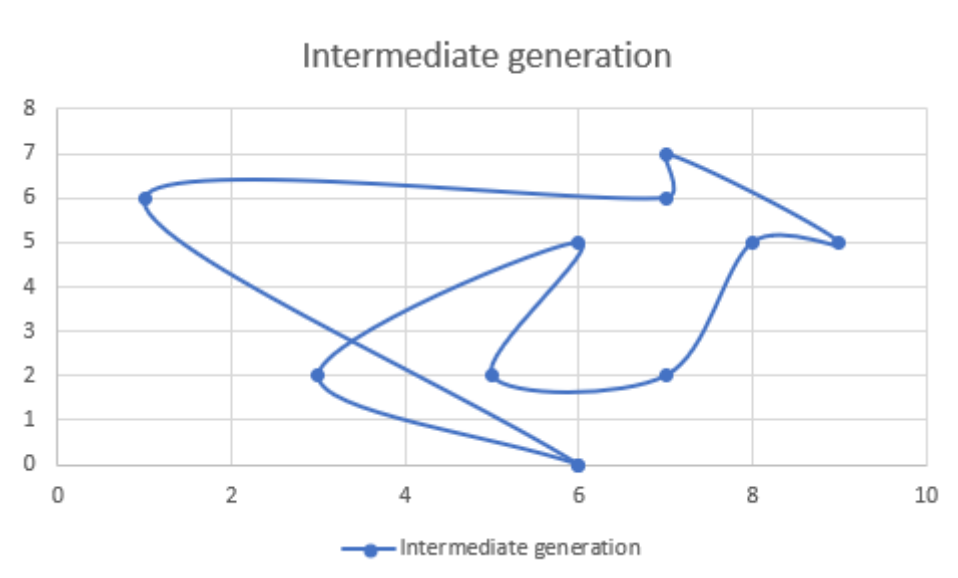
Fitness - 35.0436



Intermediate generation:

1	10	4	2	6	3	5	9	8	7	1
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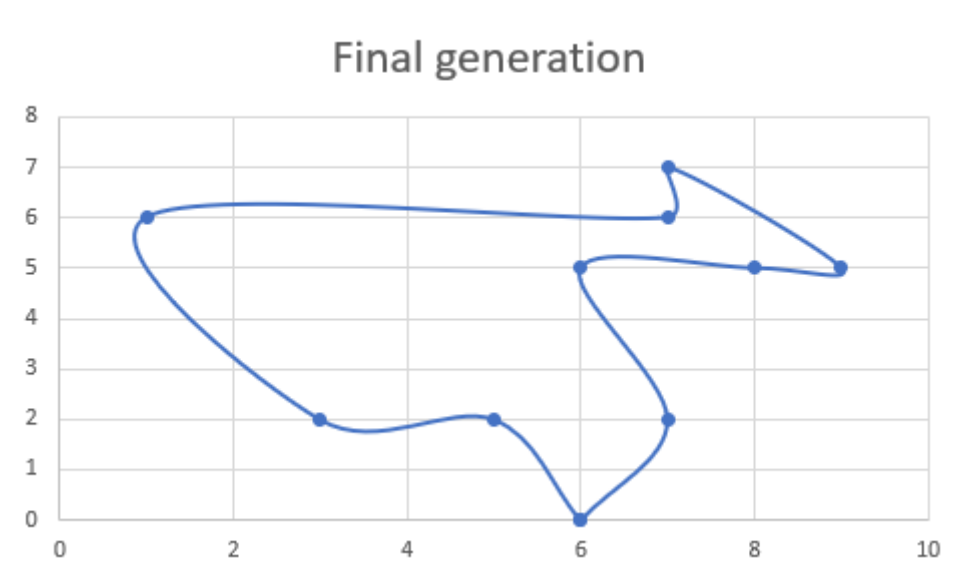
Fitness - 34.8114



Final generation path:

1	9	7	10	4	2	6	3	8	5	1
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Fitness - 32



Task 2.

Generate cities in circle

Distance matrix:

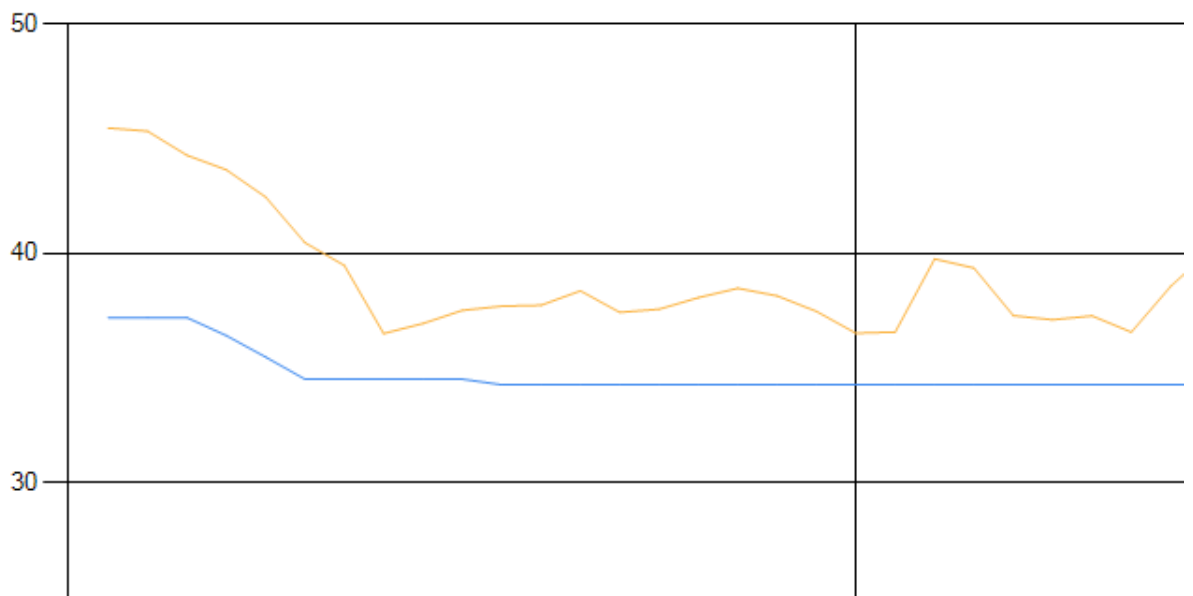
	1	2	3	4	5	6	7	8	9	10
1	0	2	4,09978	6,32456	2,19275	7,74597	3,01664	3,55051	1,00509	5,34847
2	2	0	2,19275	7,74597	4,09978	6,32456	1,04886	5,34847	1,00509	3,55051
3	4,09978	2,19275	0	8,94427	6	4,47214	1,15732	7,07107	3,16228	1,41421
4	6,32456	7,74597	8,94427	0	4,47214	10	8,3666	3,16228	7,07107	9,48683
5	2,19275	4,09978	6	4,47214	0	8,94427	5,03383	1,41421	3,16228	7,07107
6	7,74597	6,32456	4,47214	10	8,94427	0	5,47723	9,48683	7,07107	3,16228
7	3,01664	1,04886	1,15732	8,3666	5,03383	5,47723	0	6,2052	2,0431	2,5504
8	3,55051	5,34847	7,07107	3,16228	1,41421	9,48683	6,2052	0	4,47214	8
9	1,00509	1,00509	3,16228	7,07107	3,16228	7,07107	2,0431	4,47214	0	4,47214
10	5,34847	3,55051	1,41421	9,48683	7,07107	3,16228	2,5504	8	4,47214	0

Cities:

	X	Y
1	-1	4,89898
2	1	4,89898
3	3	4
4	-5	0
5	-3	4
6	5	0
7	2	4,58258
8	-4	3
9	0	5
10	4	3

population size - 10

chromosome size - 9

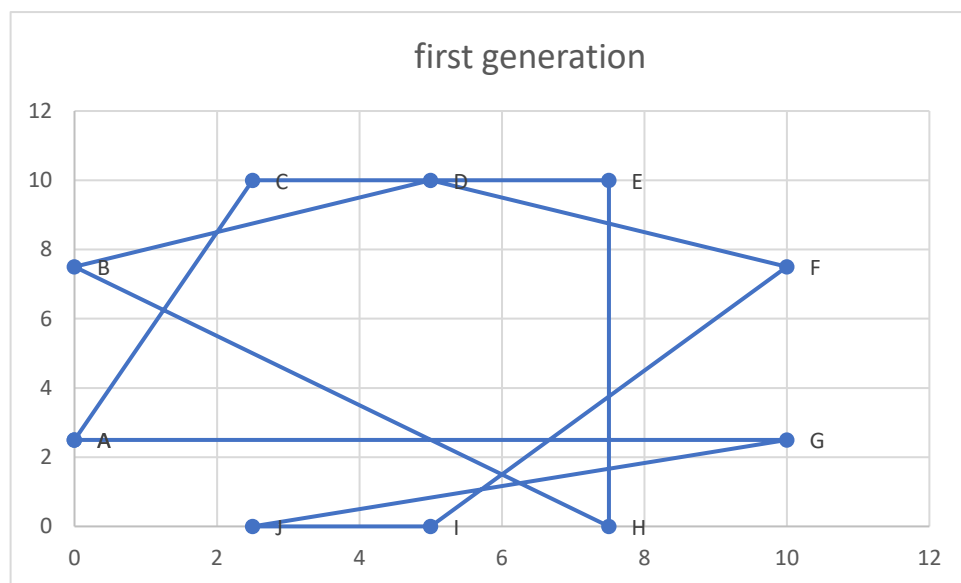


The **X** axis describes generation number, the **Y** axis describes fitness.

Blue line – the best fitness in generation

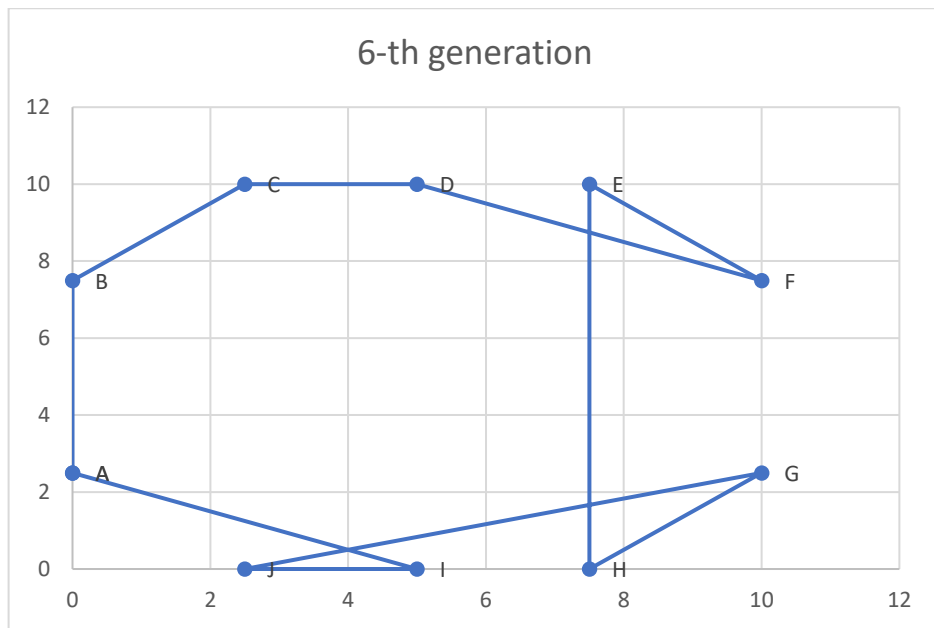
Orange line – average fitness

First generation path: The best route in first generation:



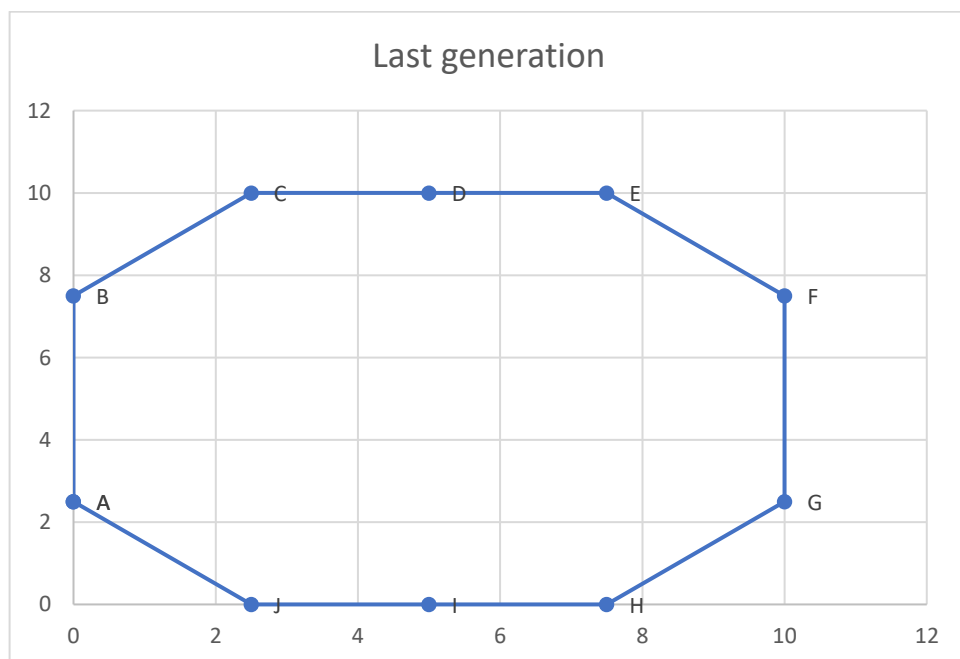
Path: A -> C -> E -> H -> B -> D -> F -> I -> J -> G -> A

The best route in intermediate generation (6):



Path: A -> B -> C -> D -> F -> E -> H -> G -> J -> I -> A

The best route in last generation:



Path: A -> B -> C -> D -> E -> F -> G -> H -> I -> J -> A