Modern intelligent IT
Lab 3 (08.04.2016)
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TASK: Traveling Salesperson Problem (TSP)

TSP with 25 cities of a fixed location

1. Assume 15 cities as shown in the next page (start from Z and return to Z).

2. Calculate distance matrix (25×25).

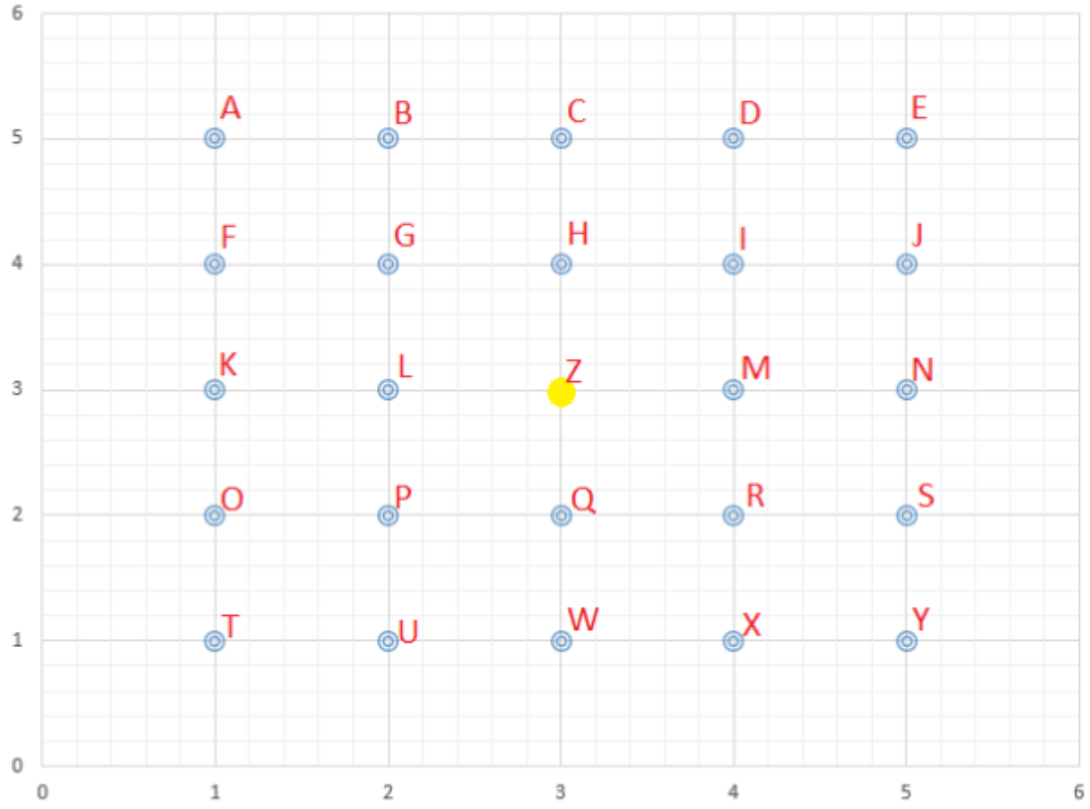
3. Apply GA and evolve chromosomes to be the tours of minimum length.

4. Also show

(5) the graph of fitness vs generation.

(6) The minimum tour in the 1st, two intermediate, and the final generation.

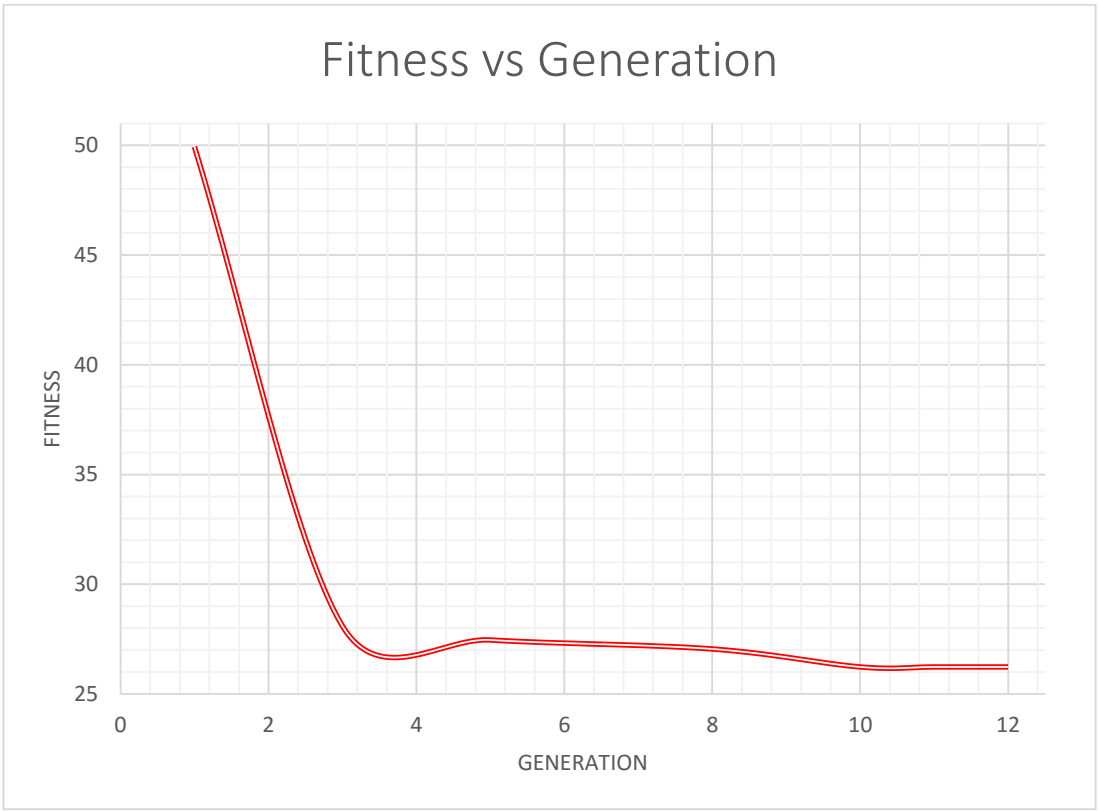
Map of 25 cities



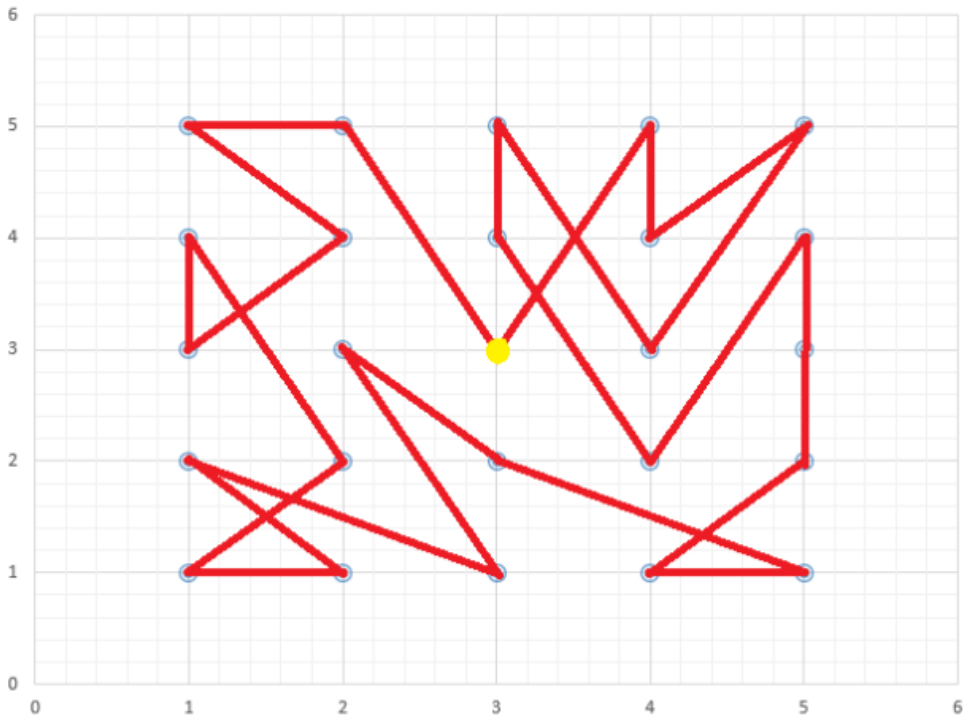
Distance matrix

0	1	2	3	4	1	1,41421	2,23607	3,16228	4,12311	2	2,23607	2,82843	3,60555	4,47214	3	3,16228	3,60555	4,24264	5	4	4,12311	4,47214	5	5,65685
1	0	1	2	3	1,41421	1	1,41421	2,23607	3,16228	2,23607	2	2,23607	2,82843	3,60555	3,16228	3	3,16228	3,60555	4,24264	4,12311	4	4,12311	4,47214	5
2	1	0	1	2	2,23607	1,41421	1	1,41421	2,23607	2,82843	2,23607	2	2,23607	2,82843	3,60555	3,16228	3	3,16228	3,60555	4,47214	4,12311	4	4,12311	4,47214
3	2	1	0	1	3,16228	2,23607	1,41421	1	1,41421	3,60555	2,82843	2,23607	2	2,23607	4,24264	3,60555	3,16228	3	3,16228	5	4,47214	4,12311	4	4,12311
4	3	2	1	0	4,12311	3,16228	2,23607	1,41421	1	4,47214	3,60555	2,82843	2,23607	2	5	4,24264	3,60555	3,16228	3	5,65685	5	4,47214	4,12311	4
1	1,41421	2,23607	3,16228	4,12311	0	1	2	3	4	1	1,41421	2,23607	3,16228	4,12311	2	2,23607	2,82843	3,60555	4,47214	3	3,16228	3,60555	4,24264	5
1,41421	1	1,41421	2,23607	3,16228	1	0	1	2	3	1,41421	1	1,41421	2,23607	3,16228	2,23607	2	2,23607	2,82843	3,60555	3,16228	3	3,16228	3,60555	4,24264
2,23607	1,41421	1	1,41421	2,23607	2	1	0	1	2	2,23607	1,41421	1	1,41421	2,23607	2,82843	2,23607	2	2,23607	2,82843	3,60555	3,16228	3	3,16228	3,60555
3,16228	2,23607	1,41421	1	1,41421	3	2	1	0	1	3,16228	2,23607	1,41421	1	1,41421	3,60555	2,82843	2,23607	2	2,23607	4,24264	3,60555	3,16228	3	3,16228
4,12311	3,16228	2,23607	1,41421	1	4	3	2	1	0	4,12311	3,16228	2,23607	1,41421	1	4,47214	3,60555	2,82843	2,23607	2	5	4,24264	3,60555	3,16228	3
2	2,23607	2,82843	3,60555	4,47214	1	1,41421	2,23607	3,16228	4,12311	0	1	2	3	4	1	1,41421	2,23607	3,16228	4,12311	2	2,23607	2,82843	3,60555	4,47214
2,23607	2	2,23607	2,82843	3,60555	1,41421	1	1,41421	2,23607	3,16228	1	0	1	2	3	1,41421	1	1,41421	2,23607	3,16228	2,23607	2	2,23607	2,82843	3,60555
2,82843	2,23607	2	2,23607	2,82843	2,23607	1,41421	1	1,41421	2,23607	2	1	0	1	2	2,23607	1,41421	1	1,41421	2,23607	2,82843	2,23607	2	2,23607	2,82843
3,60555	2,82843	2,23607	2	2,23607	3,16228	2,23607	1,41421	1	1,41421	3	2	1	0	1	3,16228	2,23607	1,41421	1	1,41421	3,60555	2,82843	2,23607	2	2,23607
4,47214	3,60555	2,82843	2,23607	2	4,12311	3,16228	2,23607	1,41421	1	4	3	2	1	0	4,12311	3,16228	2,23607	1,41421	1	4,47214	3,60555	2,82843	2,23607	2
3	3,16228	3,60555	4,24264	5	2	2,23607	2,82843	3,60555	4,47214	1	1,41421	2,23607	3,16228	4,12311	0	1	2	3	4	1	1,41421	2,23607	3,16228	4,12311
3,16228	3	3,16228	3,60555	4,24264	2,23607	2	2,23607	2,82843	3,60555	1,41421	1	1,41421	2,23607	3,16228	1	0	1	2	3	1,41421	1	1,41421	2,23607	3,16228
3,60555	3,16228	3	3,16228	3,60555	2,82843	2,23607	2	2,23607	2,82843	2,23607	1,41421	1	1,41421	2,23607	2	1	0	1	2	2,23607	1,41421	1	1,41421	2,23607
4,24264	3,60555	3,16228	3	3,16228	3,60555	2,82843	2,23607	2	2,23607	3,16228	2,23607	1,41421	1	1,41421	3	2	1	0	1	3,16228	2,23607	1,41421	1	1,41421
5	4,24264	3,60555	3,16228	3	4,47214	3,60555	2,82843	2,23607	2	4,12311	3,16228	2,23607	1,41421	1	4	3	2	1	0	4,12311	3,16228	2,23607	1,41421	1
4	4,12311	4,47214	5	5,65685	3	3,16228	3,60555	4,24264	5	2	2,23607	2,82843	3,60555	4,47214	1	1,41421	2,23607	3,16228	4,12311	0	1	2	3	4
4,12311	4	4,12311	4,47214	5	3,16228	3	3,16228	3,60555	4,24264	2,23607	2	2,23607	2,82843	3,60555	1,41421	1	1,41421	2,23607	3,16228	1	0	1	2	3
4,47214	4,12311	4	4,12311	4,47214	3,60555	3,16228	3	3,16228	3,60555	2,82843	2,23607	2	2,23607	2,82843	2,23607	1,41421	1	1,41421	2,23607	2	1	0	1	2
5	4,47214	4,12311	4	4,12311	4,24264	3,60555	3,16228	3	3,16228	3,60555	2,82843	2,23607	2	2,23607	3,16228	2,23607	1,41421	1	1,41421	3	2	1	0	1
5,65685	5	4,47214	4,12311	4	5	4,24264	3,60555	3,16228	3	4,47214	3,60555	2,82843	2,23607	2	4,12311	3,16228	2,23607	1,41421	1	4	3	2	1	0

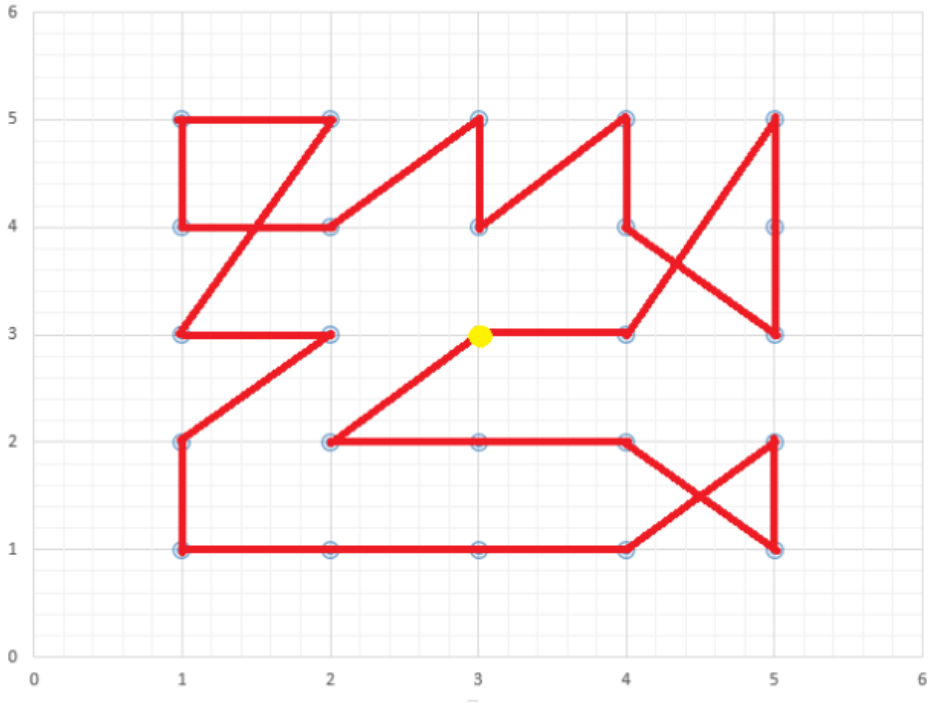
Graph of fitness vs generation



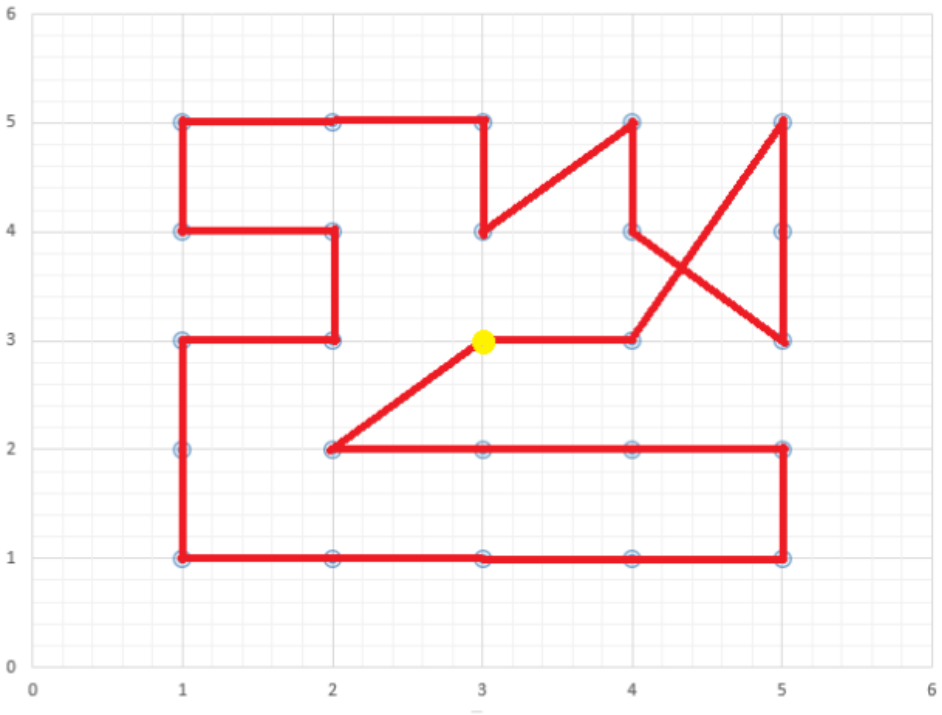
Tour in the 1st



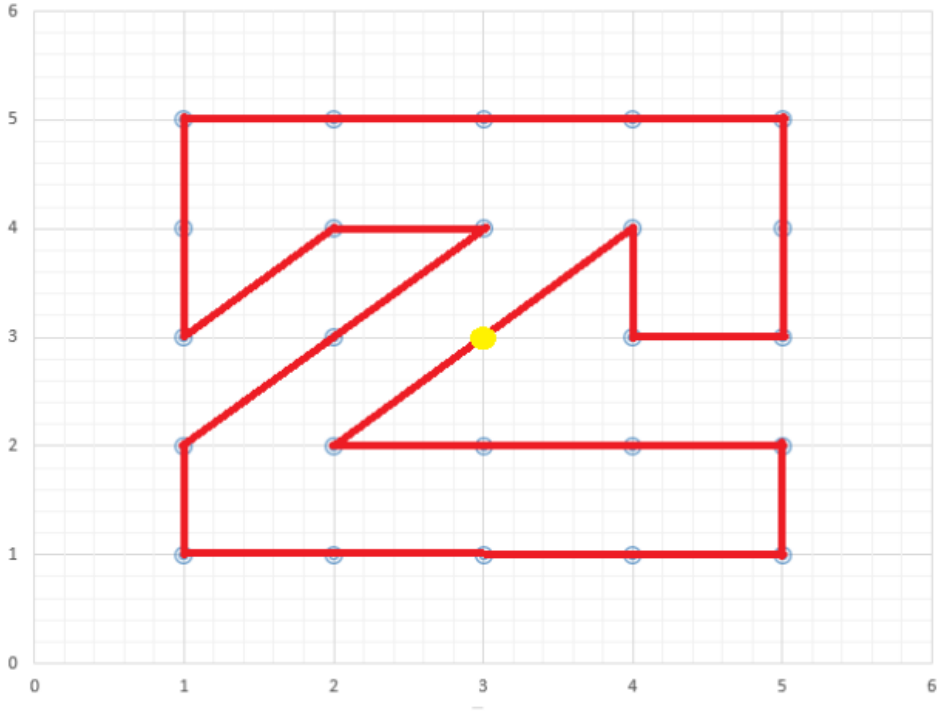
Tour in the 2st



Tour in the 3st



Tour in the 4st



Tour in the 5st