Modern intelligent IT
Lab 3 (08.04.2016)
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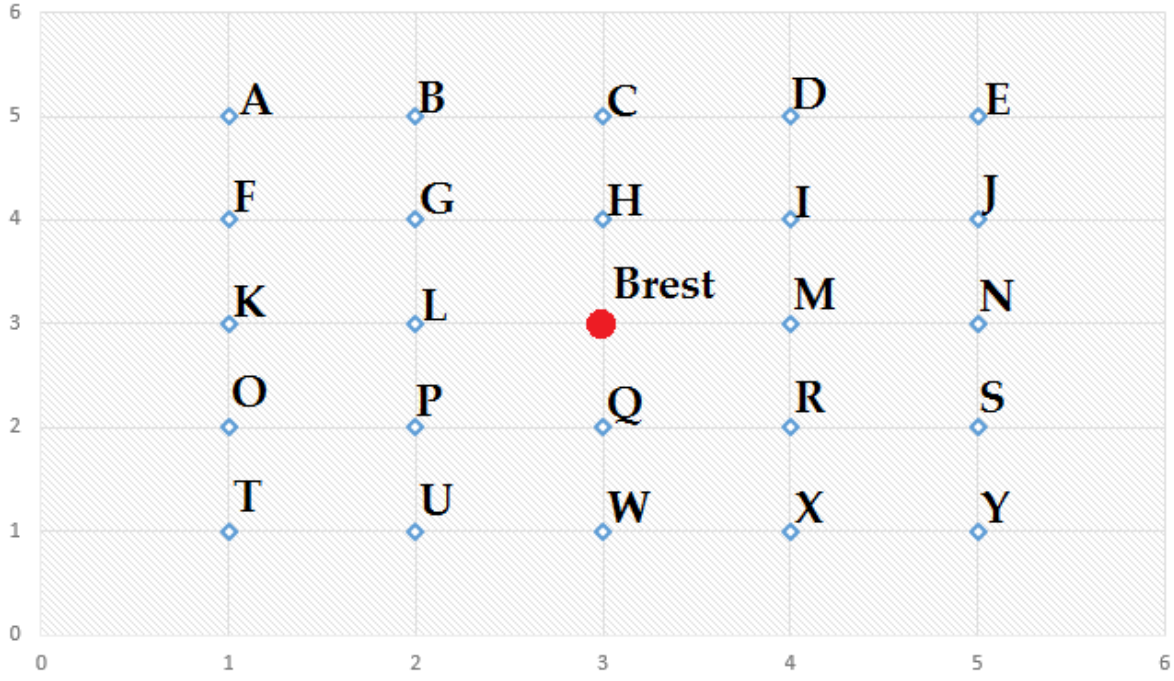
TASK: Traveling Salesperson Problem (TSP)
TSP with 25 cities of a fixed location

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

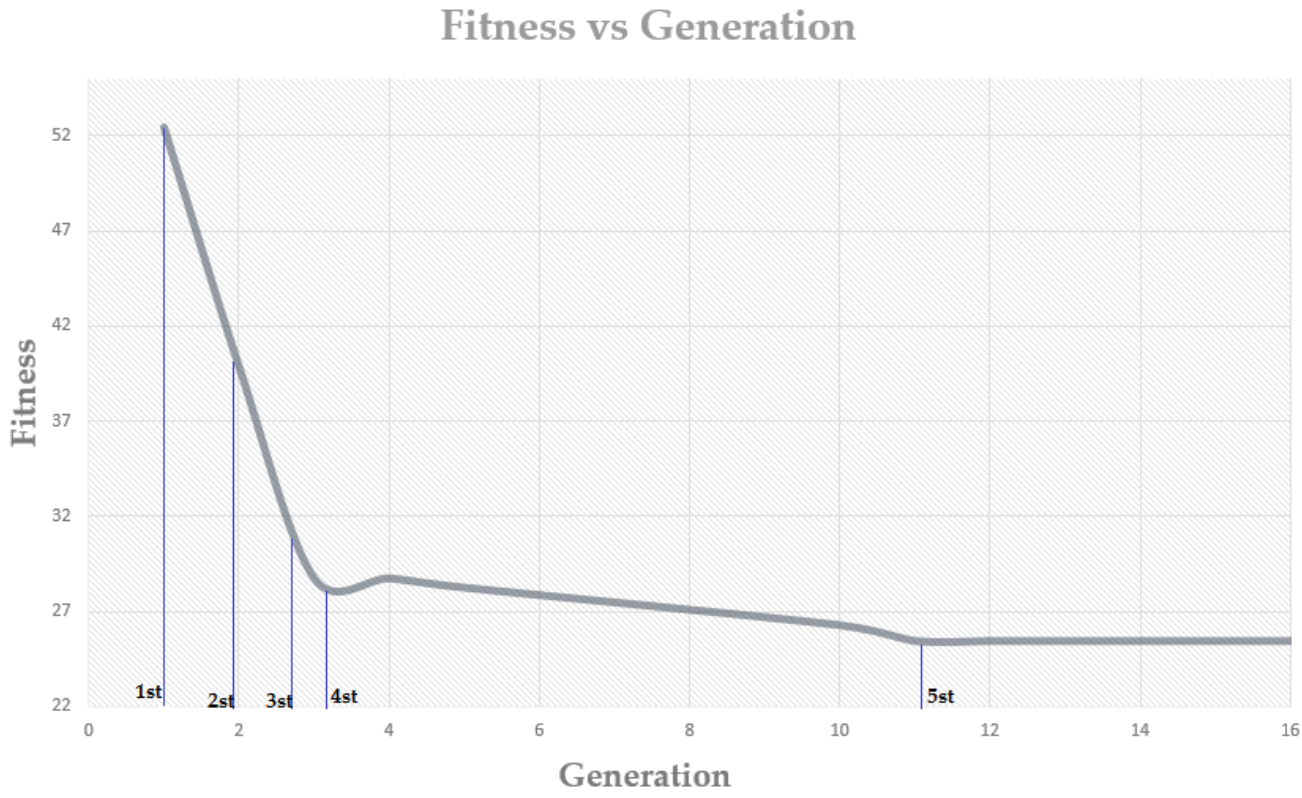


Distance matrix

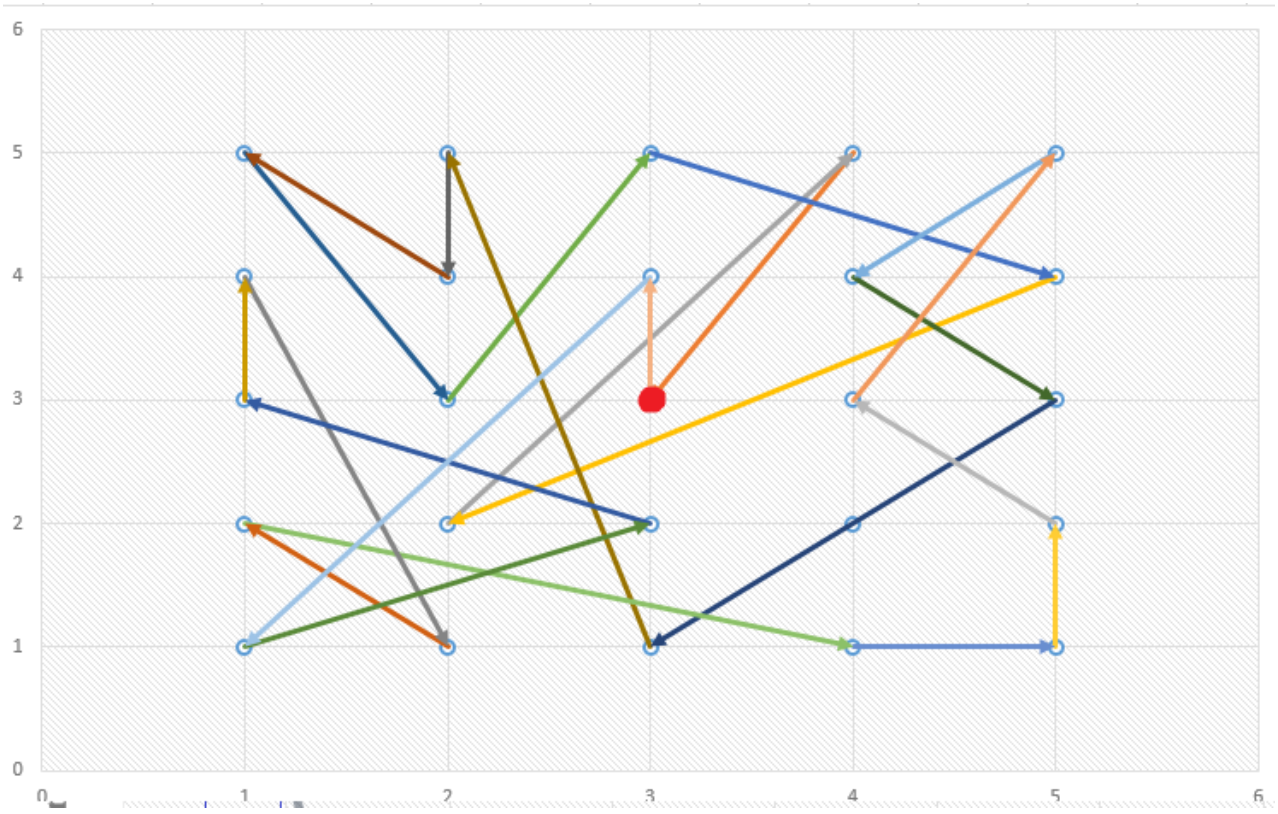
	A	B	C	D	E	F	G	H	I	J	K	L	BREST
A	0												
B	1	0											
C	2	1	0										
D	3	2	1	0									
E	4	3	2	1	0								
F	1	1,414214	2,236068	3,162278	4,123106	0							
G	1,414214	1	1,414214	2,236068	3,162278	1	0						
H	2,236068	1,414214	1	1,414214	2,236068	2	1	0					
I	3,162278	2,236068	1,414214	1	1,414214	3	2	1	0				
J	4,123106	3,162278	2,236068	1,414214	1	4	3	2	1	0			
K	2	2,236068	2,828427	3,605551	4,472136	1	1,414214	2,236068	3,162278	4,123106	0		
L	2,236068	2	2,236068	2,828427	3,605551	1,414214	1	1,414214	2,236068	3,162278	1	0	
BREST	2,828427	2,236068	2	2,236068	2,828427	2,236068	1,414214	1	1,414214	2,236068	2	1	0
M	3,605551	2,828427	2,236068	2	2,236068	3,162278	2,236068	1,414214	1	1,414214	3	2	1
N	4,472136	3,605551	2,828427	2,236068	2	4,123106	3,162278	2,236068	1,414214	1	4	3	2
O	3	3,162278	3,605551	4,242641	5	2	2,236068	2,828427	3,605551	4,472136	1	1,414214	2,236068
P	3,162278	3	3,162278	3,605551	4,242641	2,236068	2	2,236068	2,828427	3,605551	1,414214	1	1,414214
Q	3,605551	3,162278	3	3,162278	3,605551	2,828427	2,236068	2	2,236068	2,828427	2,236068	1,414214	1
R	4,242641	3,605551	3,162278	3	3,162278	3,605551	2,828427	2,236068	2	2,236068	3,162278	2,236068	1,414214
S	5	4,242641	3,605551	3,162278	3	4,472136	3,605551	2,828427	2,236068	2	4,123106	3,162278	2,236068
T	4	4,123106	4,472136	5	5,656854	3	3,162278	3,605551	4,242641	5	2	2,236068	2,828427
U	4,123106	4	4,123106	4,472136	5	3,162278	3	3,162278	3,605551	4,242641	2,236068	2	2,236068
W	4,472136	4,123106	4	4,123106	4,472136	3,605551	3,162278	3	3,162278	3,605551	2,828427	2,236068	2
X	5	4,472136	4,123106	4	4,123106	4,242641	3,605551	3,162278	3	3,162278	3,605551	2,828427	2,236068
Y	5,656854	5	4,472136	4,123106	4	5	4,242641	3,605551	3,162278	3	4,472136	3,605551	2,828427

BREST	M	N	O	P	Q	R	S	T	U	W	X	Y
0												
1	0											
2	1	0										
2,236068	3,162278	4,123106	0									
1,414214	2,236068	3,162278	1	0								
1	1,414214	2,236068	2	1	0							
1,414214	1	1,414214	3	2	1	0						
2,236068	1,414214	1	4	3	2	1	0					
2,828427	3,605551	4,472136	1	1,414214	2,236068	3,162278	4,123106	0				
2,236068	2,828427	3,605551	1,414214	1	1,414214	2,236068	3,162278	1	0			
2	2,236068	2,828427	2,236068	1,414214	1	1,414214	2,236068	2	1	0		
2,236068	2	2,236068	3,162278	2,236068	1,414214	1	1,414214	3	2	1	0	
2,828427	2,236068	2	4,123106	3,162278	2,236068	1,414214	1	4	3	2	1	0

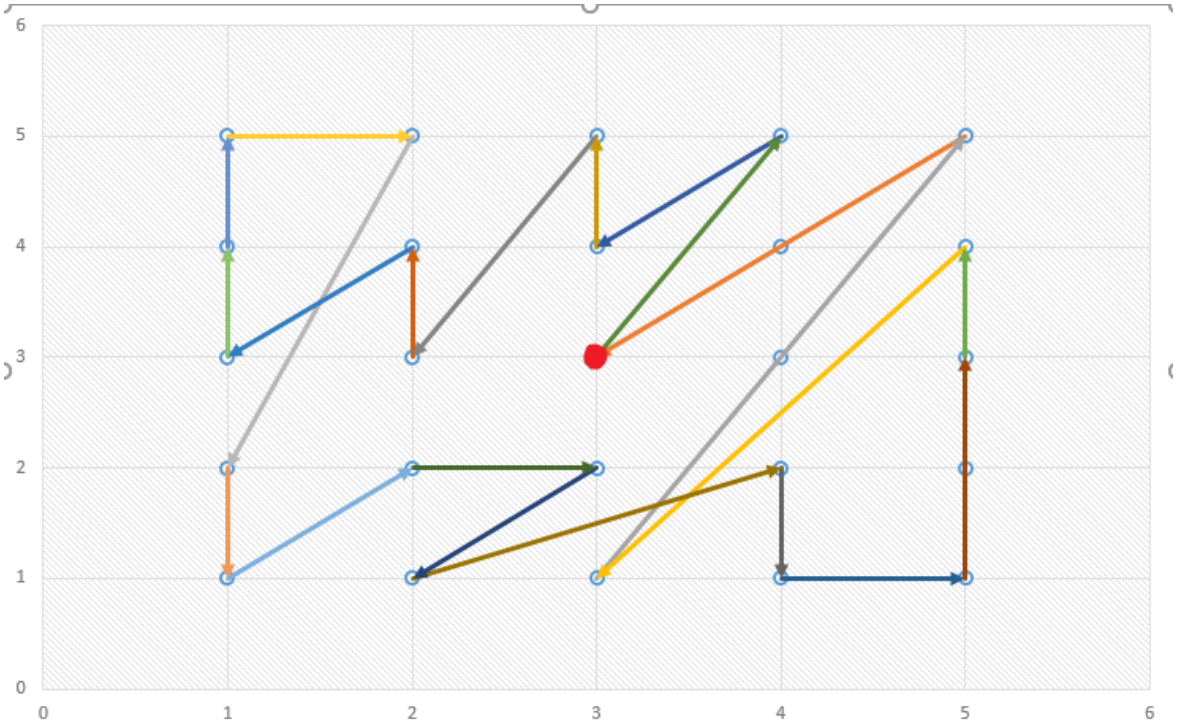
Graph of fitness vs generation



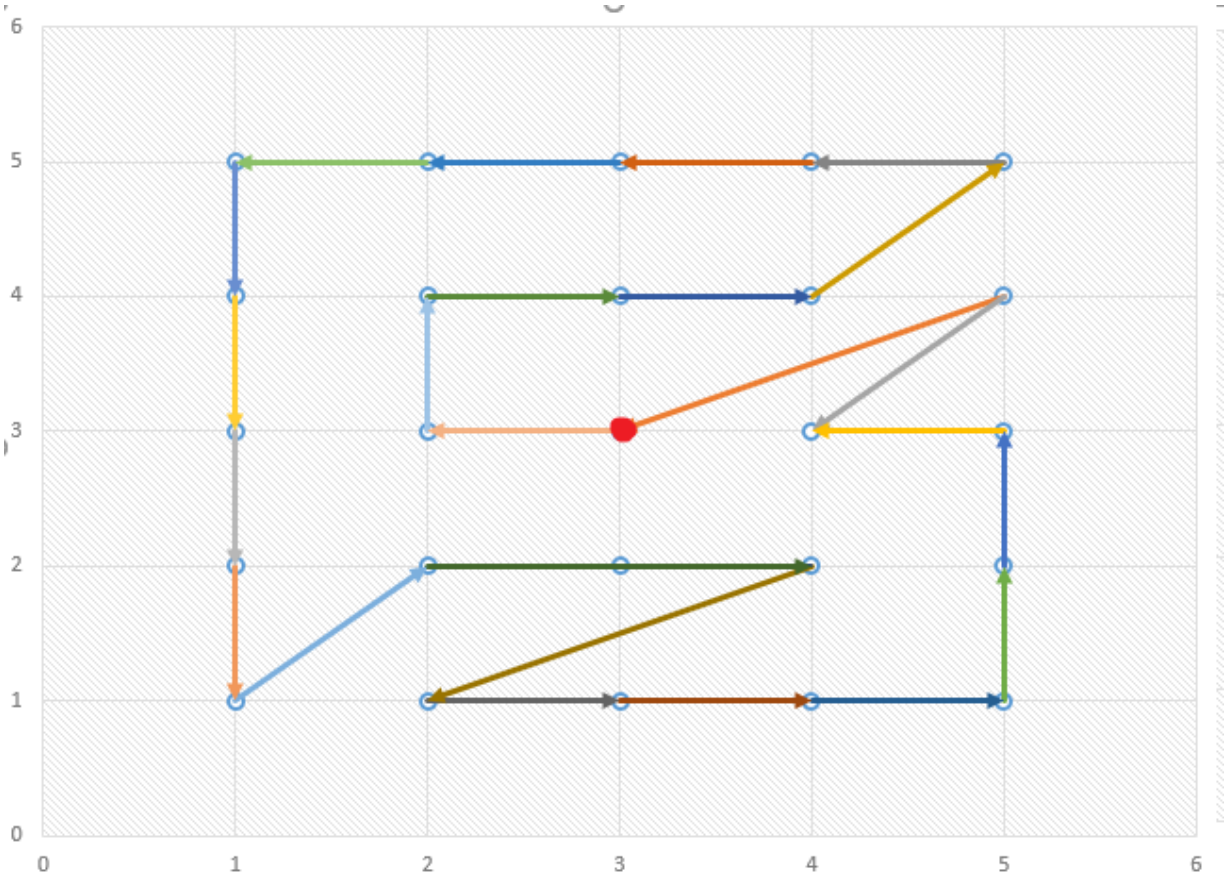
1st generation (distance 52, 25)



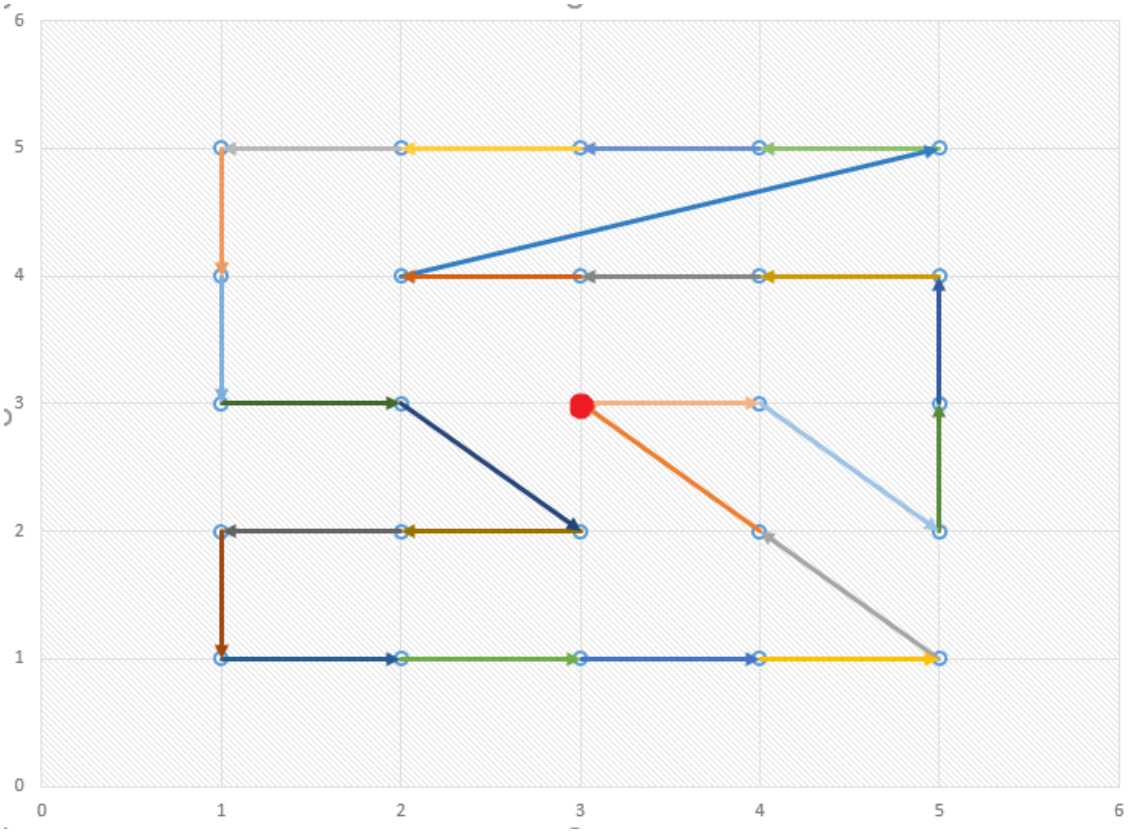
2nd generation (intermediate) (distance 39,43)



3rd generation (intermediate) (distance 29,54)



4th generation (intermediate) (distance 28,22)



5th generation (final) (distance 25,41)