List 1 report

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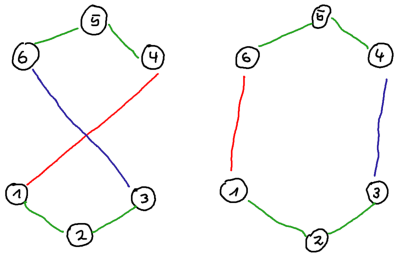
Results:

data name	best solution	MST weight	Local search based on MST			Local search			Local search speeded up		
			avg steps	avg cost	min cost	avg steps	avg cost	min cost	avg steps	avg cost	min cost
XQF131	564	474	32.31	602.60	579	133.72	612.46	582	124.61	981.18	813
XQG237	1019	897	47.16	1087.17	1064	261.54	1117.13	1066	245.06	1944.00	1523
PMA343	1368	1179	76.09	1455.45	1426	404.46	1483.75	1417	395.05	2586.37	2138
PKA379	1332	1151	92.45	1408.91	1383	450.21	1447.03	1383	438.60	2534.46	2041
BCL380	1621	1444	61.65	1710.94	1675	449.25	1818.05	1726	412.20	3442.95	2754
PBL395	1281	1124	75.45	1383.25	1356	459.17	1427.61	1359	426.74	2652.45	2156
PBK411	1343	1180	82.13	1436.26	1420	485.06	1492.49	1435	447.42	2829.54	2202
PBN423	1365	1201	83.63	1467.92	1438	498.31	1522.15	1445	465.91	2828.98	2325
PBM436	1443	1269	93.26	1560.06	1535	513.56	1610.40	1529	473.36	3039.58	2425
XQL662	2513	2240	124.13	2694.68	2645	812.53	2813.24	2708	771.82	5270.68	4347
XIT1083	3558	3253	232.96	3841.46	3771	1386.61	4019.99	3919	1330.18	7811.51	6595
ICW1483	4416	4015	300.61	4761.54	4706	1930.10	4982.06	4868	1864.24	9745.39	8407
DJC1785	6115	5541	372.50	6543.71	6459	2352.39	6881.12	6742	2285.75	13097.22	11461
DJB2036	6197	5593	398.55	6682.48	6633	2723.75	7009.80	6852	2658.48	13797.59	11841
PDS2566	7643	6956	443.28	8178.85	8136	3481.51	8713.09	8550	3041.39	17456.76	15112

As we can see both local search starting from random permutation, and local search starting from cycle made out of mst resulted in good approximation, with a little advantage for the second one. Speeding up local search resulted in result worse results, it was fast but still required a lot of steps, whereas local search based on mst was fast, required an order of magnitude fewer steps, and had the best results. It is important to pick a good starting point for metaheuristic.

QA:

Why with Euclidean metric this algorithm produce a cycle without edges that cross?



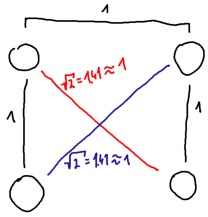
Because inversion is about demangling crosses:

$$\pi = (1, 2, 3, 6, 5, 4)$$

after $invert(\pi, 6, 4)$:

$$\pi = (1, 2, 3, 4, 5, 6)$$

Why it is not a case in this metric?



The spite of demangled lines having less length in Euclidean metric, rounded crossed edges have also lengths one and one.