Heuristic Optimization: Assignment 2

A Memetic Algorithm

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Memetic Algorithm

- The initialisation solution is generated using random vectors for each chromosome of the population.
- The crossover operator creates a new generation from two randomly chosen parents. This is done for a defined number of cross-over calculated by dividing the population size by 2. The chromosome father and mother are analysed to keep the parts that are the same then the rest is selected randomly .
- The mutant operator creates a new generation from a randomly selected parent. The number of mutation for a loop is defined by the population size divided by 4.
- Improvement algorithm is the same as in the previous assignment. User can choose between first improvement or best improvement
- Selection phase selects the best individuals from the entire population meaning the parents and the children generated by mutation and cross-overs
- Diversification check if the individuals have characteristics such as average distance and fitness and if it is the case than a mutation is apply on all of the new generation except the best ones so that the population does not loose its diversity.

Run-Time distribution

Only 10 runs per instance unfortunately the program was too slow to make more simulations.

Instance 19

run	time (s)	objective value
1	49	560904
2	48	539119
3	48	550863
4	48	567126
5	47	566872
6	47	558993
7	47	569649
8	51	548559
9	52	558896
10	48	556527

Instance 38

run	time	objective value
1	46	174669
2	46	174184
3	47	188054
4	47	177213
5	46	175730
6	44	183598
7	44	186148
8	46	185985
9	43	182538
10	46	197147

Instance 42

run	time	objective value
1	55	517992
2	53	524605
3	53	506680
4	58	514753
5	52	496032
6	58	510436
7	56	504923
8	54	497925
9	53	520435
10	56	512305

Instance 86

run	time	objective value
1	45	184133
2	49	182593
3	46	224353
4	50	176166
5	47	206737
6	49	195677
7	49	218605
8	47	195148
9	49	198664
10	52	192363

Results

The following numbers are the results of the simulation over the 125 instances. The simulation was not very conclusive unfortunately. The objective value was not at all optimal and the computation time very high.

Computation_time : 5215 s
neighbor : --transpose
improvement : --best

12975
15788
11642
13377
15825
112709
97927
83558
87626
90748
269050
318746
268169
216625
244564
498124
387331
612931
565397
441621
901600
561887
542998
747453
588271
3908
5574
5220
8730
3795
61555
79325
85798
95375
63953
199811
313636

196235
264882
265331
534727
507759
403454
435837
396580
837526
626159
767396
669349
613052
3635
1607
2001
3188
3954
69738
78172
81225
44150
96332
232927
254121
223098
251149
163718
340243
549165
465598
446061
327474
671565
638493
641822
615317
613404
7923
4716
14025
21322
19243
106655
119994
87542
53237
68717
220116

270742
215628
225225
262797
385863
464843
421017
397939
455433
531830
713119
724645
650078
524570
9306
26612
938
14810
4642
40675
99122
90704
103928
103041
313905
310902
244357
307935
224289
469028
442268
369212
446203
402784
556479
636569
478880
560696
628912