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Heuristic Optimisation

Implementation Exercise 1

Iterative improvement algorithms for the PFSP

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1 Introduction

2 Code Use

3 Exercise 1.1

3.1 The Results

We list here the average percentage deviation from the best solutions for each algorithm tested, along with the average computation time:

Algorithm	APD	ACT(ms)
–random–exchange–best	289	111
–random–exchange–first	295	38
–random–insert–best	313	100
–random–insert–first	277	133
–random–transpose–best	411	5
–random–transpose–first	416	12
–slack–exchange–best	241	110
–slack–exchange–first	255	34
–slack–insert–best	223	103
–slack–insert–first	200	120
–slack–transpose–best	299	16
–slack–transpose–first	308	16

Figure 1: The APD and ACT for each algorithm.

3.2 Difference between the solutions

We used the Student t-test to determine whether there there is a statistically significant difference between the solutions generated by the different perturbative local search algorithms.

	1	2	3	4	5	6	7	8	9	10	11	12
1		0.3946534	0.07607217	0.4263596	6.967038e-08	2.28503e-06	0.01718699	0.06069461	0.01642366	0.002925141	0.9075012	0.7670622
2			0.008214209	0.7082091	0.0001230069	0.0002814088	0.0003217527	0.0208894	0.0002224225	3.885381e-06	0.1482378	0.02733348
3				0.002881668	3.526205e-05	8.519584e-05	3.1477e-06	1.102071e-05	9.521436e-05	1.494252e-05	0.04240414	0.1129525
4					5.415206e-07	1.029794e-06	0.004716419	0.03777324	0.0126438	0.00134803	0.6283332	0.3083158
5						0.2608918	2.849944e-06	8.373585e-06	3.428071e-05	1.008478e-05	0.0005169061	0.0008130384
6							5.733163e-06	1.244147e-05	6.134921e-05	1.893243e-05	0.0007349604	0.001103452
7								0.004145256	0.1388542	0.002564425	1.704456e-09	5.077375e-10
8									0.01561275	0.0002874112	7.797309e-07	2.86032e-08
9										6.695723e-07	1.507685e-07	1.043949e-07
10											9.012818e-09	1.203368e-08
11												0.000153011
12												

Figure 2: P-values for each combination of algorithms (Student t-test).

4 Exercise 1.2