

Three configurations used to benchmark the developed modules are shown below:

algorithm	mutation	mutation probability	crossover	Selection	pool size	elitism
1	inversion	0.4	pmx	tournament	20	yes
2	inversion	0.2	order	fitness proportional	n/a	yes
3	inversion	0.3	order	tournament	10	yes

Results for the algorithms are displayed over the following pages.

algorithm1						
eil51	generations	pop size				
		20	50	100	200	
		2000	501	467	473	454
		5000	467	465	468	451
		10000	467	465	463	450
		20000	448	463	462	450
eil76	generations	pop size				
		20	50	100	200	
		2000	702	612	634	627
		5000	660	612	623	595
		10000	617	612	616	595
		20000	615	612	616	593
eil101	generations	pop size				
		20	50	100	200	
		2000	926	767	792	780
		5000	794	682	709	701
		10000	766	682	709	694
		20000	730	682	703	694
kroA100	generations	pop size				
		20	50	100	200	
		2000	34396	26100	25254	31711
		5000	28762	24124	22687	24052
		10000	26220	24006	22527	24052
		20000	25690	24006	22527	22767
kroaC100	generations	pop size				
		20	50	100	200	
		2000	24684	26053	28917	36571
		5000	28360	23250	23351	24487
		10000	25027	23250	23189	23337
		20000	24415	23250	23189	23193
kroaD100	generations	pop size				
		20	50	100	200	
		2000	38283	26180	29613	29444
		5000	30540	23160	23006	24674
		10000	26707	23160	23006	23410
		20000	26300	23160	22897	22585
lin105	generations	pop size				
		20	50	100	200	
		2000	25420	17770	20205	24710
		5000	20720	16131	15848	16441
		10000	17684	16131	15824	15891
		20000	17216	16131	15284	15891
pcb442	generations	pop size				
		20	50	100	200	
		2000	120572	108572	105834	93857
		5000	77592	73946	70427	68574
		10000	64957	66846	63956	56945
		20000	57294	54826	63956	53058
pr2329	generations	pop size				
		20	50	100	200	
		2000	6333312	5689381	6110737	7598478
		5000	4253278	3719732	4313843	6424534
		10000	2882447	2397875	3155432	6304827
		20000	1755307	1329168	2053452	6038473
usa	timed out					

eil51	generations	pop size			
		20	50	100	200
		2000	458	454	472
		5000	458	452	461
		10000	458	448	454
		20000	453	448	449
eil76	generations	pop size			
		20	50	100	200
		2000	612	652	795
		5000	611	618	666
		10000	595	607	630
		20000	594	602	601
eil101	generations	pop size			
		20	50	100	200
		2000	840	844	1029
		5000	728	750	886
		10000	712	707	785
		20000	702	700	707
kroA100	generations	pop size			
		20	50	100	200
		2000	29010	29267	43069
		5000	23694	24733	32256
		10000	22909	23079	28567
		20000	22291	22578	24474
kroaC100	generations	pop size			
		20	50	100	200
		2000	27566	29840	40215
		5000	22833	22913	32980
		10000	22546	21896	26461
		20000	22546	21628	22826
kroaD100	generations	pop size			
		20	50	100	200
		2000	28977	28519	36537
		5000	24266	24799	30819
		10000	24015	23400	27856
		20000	23770	22881	22969 c
lin105	generations	pop size			
		20	50	100	200
		2000	20333	22152	28772
		5000	17170	17439	20569
		10000	16488	15552	18306
		20000	16488	15171	16759
pcb442	generations	pop size			
		20	50	100	200
		2000	110526	104520	90345
		5000	76846	71394	66693
		10000	63057	65843	58572
		20000	56028	53526	52238
pr2329	generations	pop size			
		20	50	100	200
		2000	4325923	4752730	3259273
		5000	2105289	1952374	150284
		10000	1129472	875937	692837
		20000	509235	335927	236947
usa13509	generations	pop size			
		20	50	100	200
		2000	1687916799	1628301374	1597401410
		5000	1383822357	1350642994	1355868592
		10000	1157667945	1164591910	1188984289
		20000	950985222	997065404	1046596528
					968274028

Algorithm 3

		pop size			
		20	50	100	200
eil51	generations	2000	489	463	460
		5000	481	448	452
		10000	474	448	452
		20000	467	448	451
					446
eil76	generations	2000	632	623	620
		5000	632	596	595
		10000	632	596	586
		20000	631	596	579
					573
eil101	generations	2000	827	767	782
		5000	719	721	713
		10000	719	721	710
		20000	719	721	710
					697
kroA100	generations	2000	27797	23313	23701
		5000	26940	23313	22557
		10000	25695	22893	22557
		20000	25484	22893	22557
					22384
kroaC100	generations	2000	26886	23139	22099
		5000	25368	22704	21554
		10000	25368	22020	21343
		20000	25033	21942	21343
					21131
kroaD100	generations	2000	28953	24884	23265
		5000	25500	23695	22621
		10000	25338	23695	22210
		20000	24891	22610	21957
					22136
lin105	generations	2000	17899	16202	15562
		5000	17431	15326	15078
		10000	17346	15326	14946
		20000	17346	15015	14770
					14521
pcb442	generations	2000	11863	104520	98573
		5000	78376	72645	70437
		10000	65836	65927	64366
		20000	55826	54736	53856
					52034
pr2329	generations	2000	4216573	3705092	3563727
		5000	2184713	1859713	1704896
		10000	1146344	868287	740535
		20000	505032	322633	235565
					181446
usa13509	generations	2000	16586739431623456374	1593470344	1523495839
		5000	13957294831334435994	1353609743	1334506734
		10000	11139853401065891910	1134987633	1034598734
		20000	1034589349 993365704	1034983593	936498349

Algorithm 3 over 30 iterations

test file name	mean result	standard deviation	mean computation time
eil51	462	7.84	2.01
eil76	608	9.38	2.78
eil101	702	10.32	3.54
kroA101	23318	668.82	3.25
kroC101	22664	803.5	3.38
kroD101	26021	967	3.34
lin105	18384	1301	3.27
pcb442	51246	3896	5.55
pr2392	2526604	39726	22.5
usa13509	1054122105	4545890	143.02