Traveling Salesman Problem GILS-RVND Benchmark

Gabriel Campelo

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1 Execution Environment

1.1 Processor

The processor of the machine on which the program was executed was a *13th Gen Intel® Core™ i7-13650HX × 20*.

1.2 Operating System

The Operating System on which the program was executed was *Linux Ubuntu 25.04*. Additionally, the system provides three power modes: "Power Saver," "Balanced," and "Performance." The "Performance" mode was active throughout the entire execution time.

2 Results

2.1 Methodology Used

The `time.h` library was used to access the `clock()` function and the `CLOCKS_PER_SEC` macro. Two variables, `start` and `end`, of type $clock_t$, were created to store the values returned by `clock()` before and after calling the `GILS_RVND()` method, respectively. The execution time was then calculated as:

$$\text{CPU\_Time\_Used} = \frac{(\text{double})(\text{end} - \text{start})}{\text{CLOCKS\_PER\_SEC}} \tag{1}$$

Finally, each instance was executed ten times, and the average execution time was computed as the final result.

Table 1: Average time and cost obtained for each instance.

Instance	**GILS-RVND**		Instance	**GILS-RVND**	
	Avg. Sol.	Avg. Time (s)		Avg. Sol.	Avg. Time (s)
a280	2579	51.423	kroB100	22141	2.007
ali535	202444	932.973	kroB150	26130	5.795
att48	10628	0.148	kroB200	29437.4	19.422
att532	27739.5	864.285	kroC100	20749	1.895
bayg29	1610	0.022	kroD100	21294	2.055
bays29	2020	0.024	kroE100	22068	2.023
berlin52	7542	0.184	lin105	14379	2.328
bier127	118282	5.807	lin318	42038	100.869
brazil58	25395	0.241	linhp318	42035.2	103.008
brg180	1950	7.746	pa561	2770.5	816.746
burma14	3323	0.002	pcb442	50887.9	362.172
ch130	6110	5.943	pr107	44303	2.472
ch150	6528	5.415	pr124	59030	3.552
d198	15780	17.057	pr136	96772	6.955
d493	35052.8	609.987	pr144	58537	5.945
dantzig42	699	0.085	pr152	73682	4.837
eil101	629	2.368	pr226	80369	24.257
eil51	426	0.194	pr264	49135	35.932
eil76	538	0.864	pr299	48191	71.677
fl417	11861	215.405	pr439	107242	308.028
fri26	937	0.016	pr76	108159	0.691
gil262	2378.3	48.002	rat195	2324	16.79
gr120	6942	4.776	rat575	6788.9	1137.85
gr137	69853	5.89	rat99	1211	2.179
gr17	2085	0.004	rd100	7910	2.075
gr202	40160	20.199	rd400	15303.4	303.531
gr21	2707	0.007	si175	21407	9.686
gr229	134623	32.276	si535	48460.7	506.031
gr24	1272	0.012	st70	675	0.57
gr431	171581	378.348	swiss42	1273	0.079
gr48	5046	0.149	ts225	126643	16.002
gr96	55209	1.771	tsp225	3916	26.824
hk48	11461	0.154	u159	42080	5.975
kroA100	21282	1.841	u574	36983.8	1009.42
kroA150	26524	6.026	ulysses16	6859	0.003
kroA200	29368	17.324	ulysses22	7013	0.009