Mini Project-2

Simulated Annealing Engine for Slicing Floorplan

APPROACH USED TO DETERMINE THE PARAMETERS FOR SA:

For the simulated annealing algorithm, there are numerous parameters for which the values are dependent on the way they are implemented. In this implementation, initially, the starting temperature is set approximately at 1000000000 and the final temperature is set at 0.01 degrees Celsius. Now coming to the step size, it was first set to 0.01 steps per move per iteration. Finally, the team settled on an exponential decay pattern for the cooling schedule, in which the temperature was multiplied by 0.956 for each iteration.

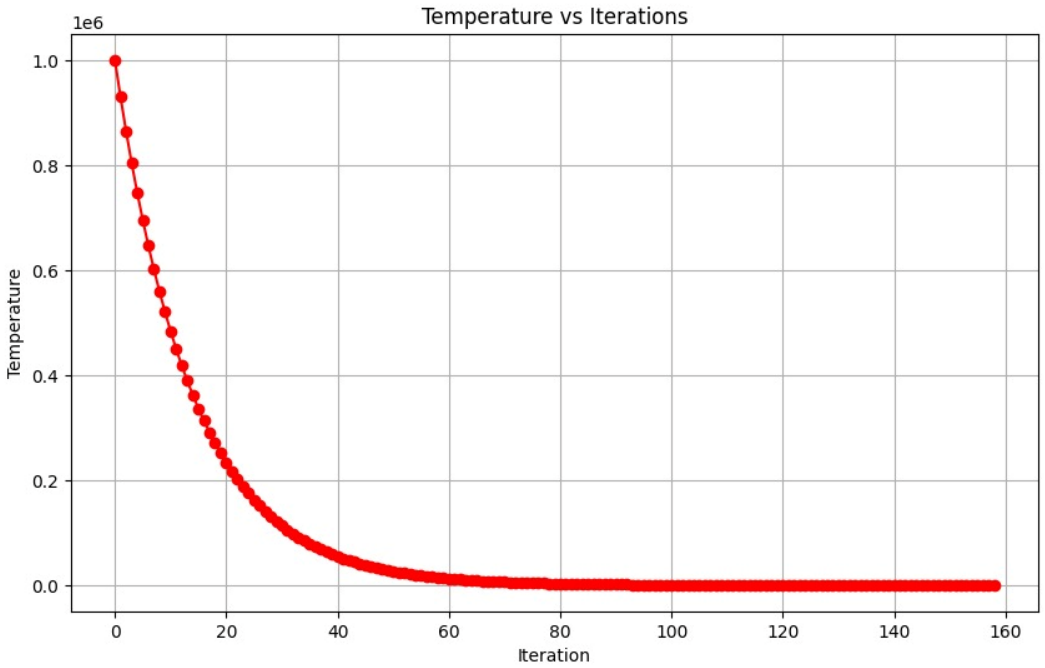
In the end, these adjustments were made to achieve a near-optimal performance. The cooling factor was maintained at 0.956 with the freezing temperature at 0.01. However, the starting temperature and the number of steps per iteration were altered, based on the number of blocks.

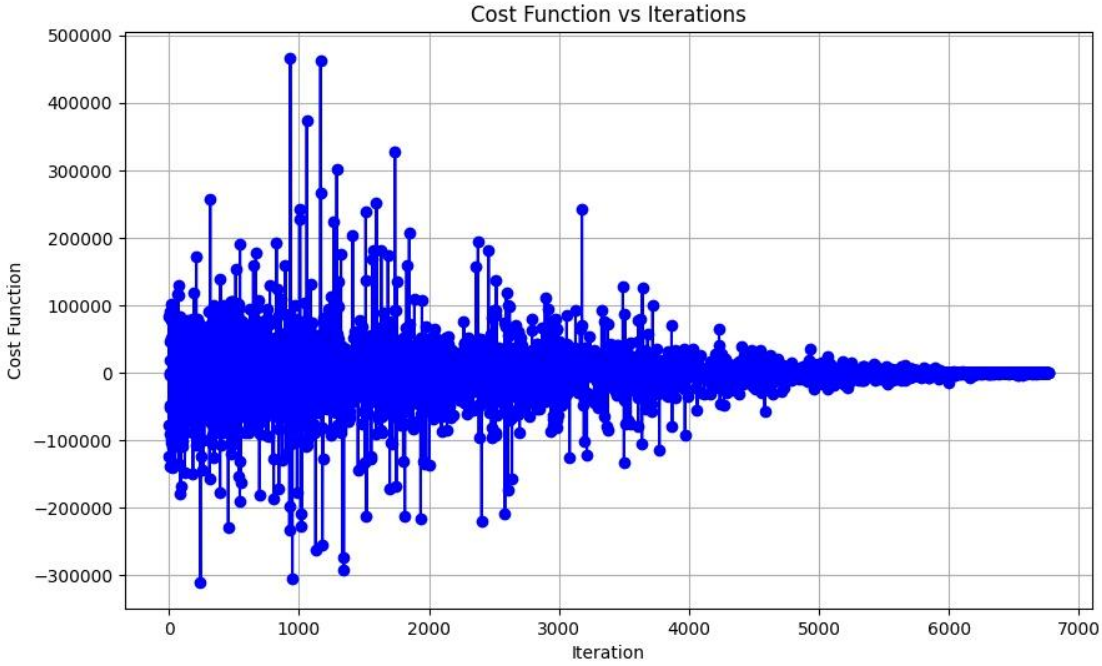
In particular, the steps per iteration equals the input size, and the starting temperature is a multiple of 10000 * block size. These parameters were selected through trial and error-based testing to provide the best run time and black area percentage values for all input sizes.

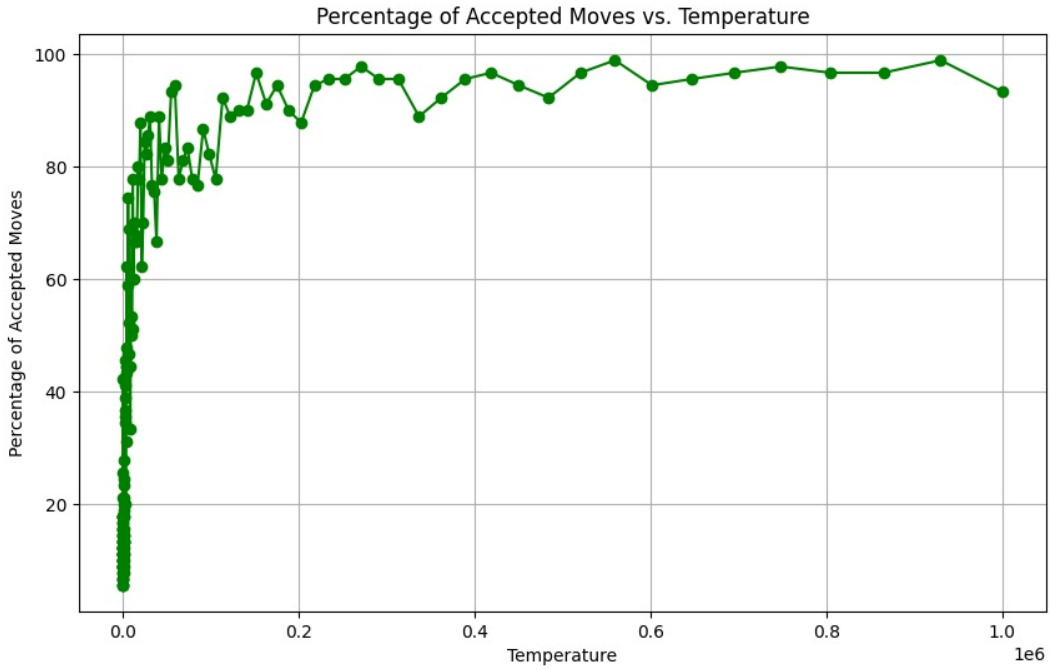
SUMMARY OF PARAMETERS USED FOR SA:

GSRC Benchmark Blocks	Cooling Factor	No. of Moves	Initial Temperature	Final Temperature
n10_HARD	0.927	10	100000	0.01
n30_HARD	0.927	30	300000	0.01
n50_HARD	0.927	50	500000	0.01
n100_HARD	0.927	100	1000000	0.01
n200_HARD	0.927	200	2000000	0.01
n300_HARD	0.945	300	3000000	0.01

n10_SOFT	0.927	10	100000	0.01
n30_SOFT	0.927	30	300000	0.01
n50_SOFT	0.927	50	500000	0.01
n100_SOFT	0.956	155	1000000	0.01
n200_SOFT	0.899	373	2000000	0.01
n300_SOFT	0.899	583	3000000	0.01


Temperature vs Iterations
1e6
1.0
0.8
0.6
0.4
0.2
0.0
Temperature
0
20
40
60
80
100
120
140
160
Iteration


Cost Function vs Iterations
500000
400000
300000
200000
100000
0
−100000
−200000
−300000
Cost Function
0
1000
2000
3000
4000
5000
6000
7000
Iteration


Percentage of Accepted Moves vs. Temperature
Percentage of Accepted Moves
100
80
60
40
20
0.0
0.2
0.4
0.6
0.8
1.0
Temperature
1e6