

COMP 5660 Fall 2024 Assignment 1c

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1 Green Problem 1c

1.1 Parameters

| Parameter | Value |
|-----------------------------|----------------------------------|
| μ | 20,000 |
| Number of Children | 150 |
| Mutation Rate | 0.05 |
| Parent Selection | k_tournament_without_replacement |
| Parent Selection k_kwargs | {'k': 18} |
| Survival Selection | k_tournament_without_replacement |
| Survival Selection k_kwargs | {'k': 18} |
| Recombination kwargs | {'method': 'one-point'} |

Table 1: Evolutionary Algorithm Parameters

1.2 Graphs

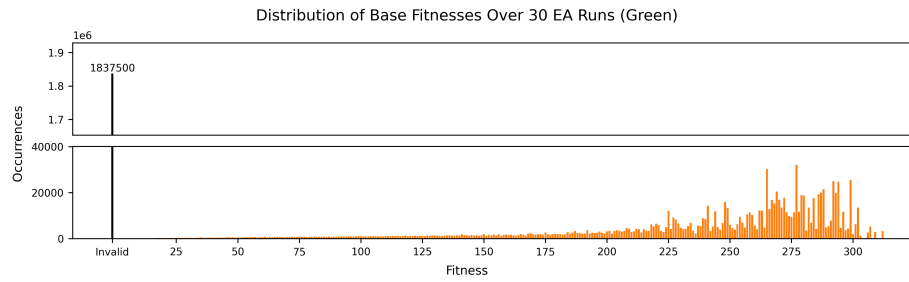


Figure 1: Base fitness histogram

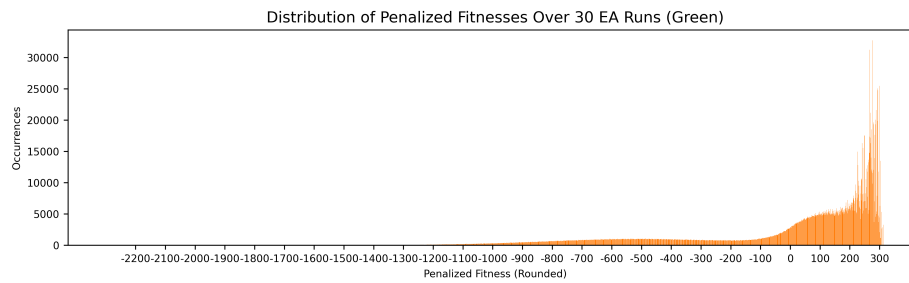


Figure 2: Penalized fitness histogram

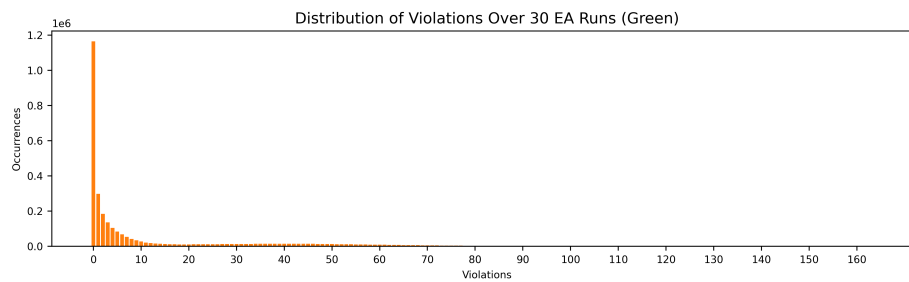


Figure 3: Violation histogram

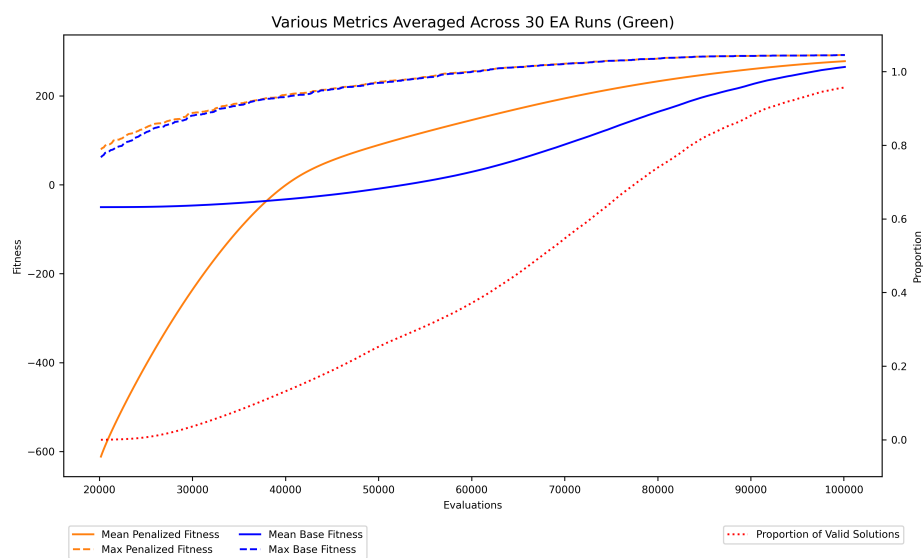


Figure 4: Evals vs fitness plot

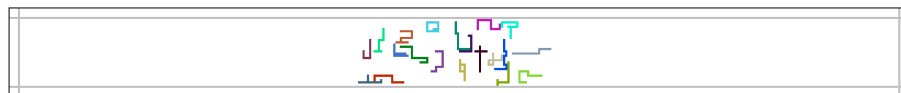


Figure 5: Green 1c best solution

1.3 Statistical Analysis

| Parameter | 1c | 1b |
|-------------------|-----------------------|----------|
| Mean | 292.2 | 214.9 |
| Stdv | 11.24155 | 31.70266 |
| Number of Samples | 30 | |
| p-value | 8.778909489128499e-15 | |
| α -value | 0.05 | |

Table 2: Comparison of Results for Data Sets 1a and 1b

The statistical analysis strongly supports rejecting the null hypothesis, with the p-value (8.778909489128499e-15) being much smaller than the α -value (0.05), indicating a significant difference between the two data sets. Based off this, we can confidently conclude that 1c had much better performance.