COMP 5660 Fall 2024 Assignment 1b

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1 Easy Green Problem

1.1 Parameters

Parameter	Value
μ	2000
Number of Children	3000
Mutation Rate	0.1
Parent Selection	k_tournament_with_replacement
Parent Selection k_kwargs	{'k': 4}
Survival Selection	k_tournament_without_replacement
Survival Selection k_kwargs	{'k': 4}
Recombination kwargs	{'method': 'one-point'}

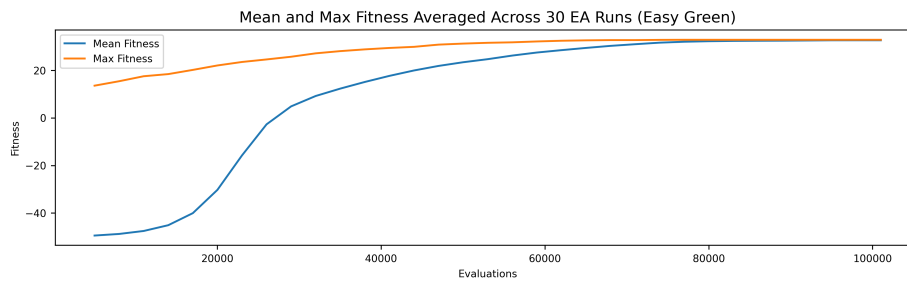Table 1: Evolutionary Algorithm Parameters

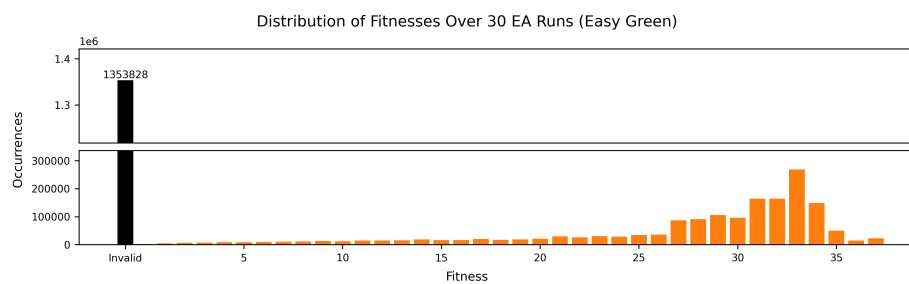## 1.2 Graphs

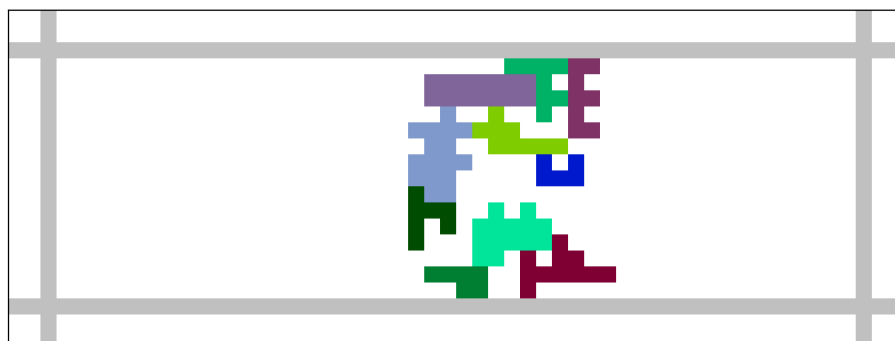Figure 1: Easy green evals-fitness plot

Figure 2: Easy green histogram

Figure 3: Easy green best solution

1.3   Statistical Analysis

Parameter	1a	1b
Mean	20.76667	32.96667
Stdv	1.813423763803275	2.092405534197477
Number of Samples	30	
p-value	1.4734706448777328e-31	
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 (1.4734706448777328e-31) 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 1b had much better performance.

2   Hard Green Problems

2.1   Parameters

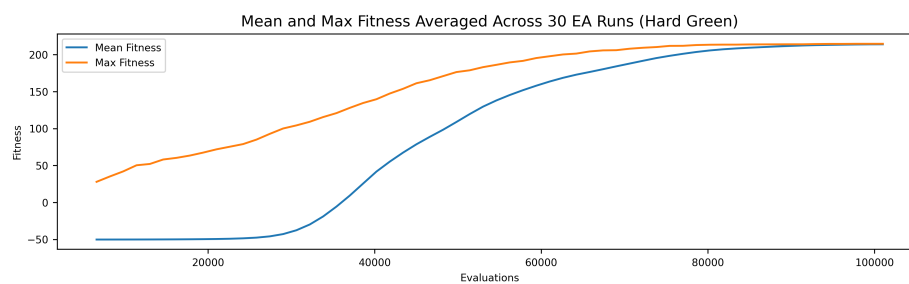| Parameter	Value
μ	5000
Number of Children	1600
Mutation Rate	0.05
Parent Selection	k_tournament_with_replacement
Parent Selection k_kwargs	{'k': 4}
Survival Selection	k_tournament_without_replacement
Survival Selection k_kwargs	{'k': 4}
Recombination kwargs	{'method': 'one-point'}

Table 3: Evolutionary Algorithm Parameters

2.2   Graphs
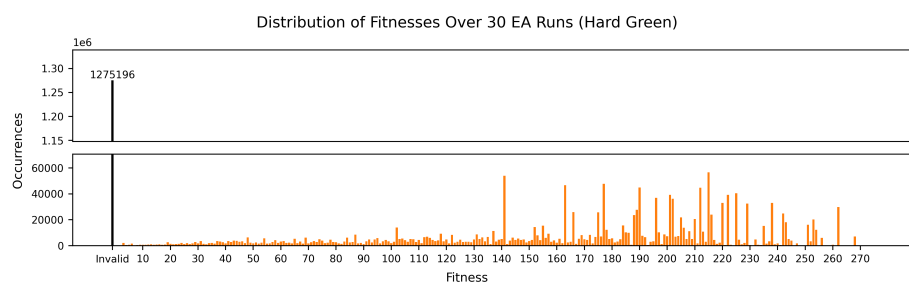
Figure 4: Hard green evals-fitness plot

Figure 5: Hard green histogram

Figure 6: Hard green best solution

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2.3   Statistical Analysis

Parameter	1a	1b
Mean	92.33333	214.9
Stdv	20.22857885020227	31.70265952076663
Number of Samples	30	
p-value	3.7648796943494e-23	
α-value	0.05	

Table 4: Comparison of Results for Data Sets 1a and 1b

The statistical analysis strongly supports rejecting the null hypothesis, with the p-value (3.7648796943494e-23) 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 1b had much better performance.