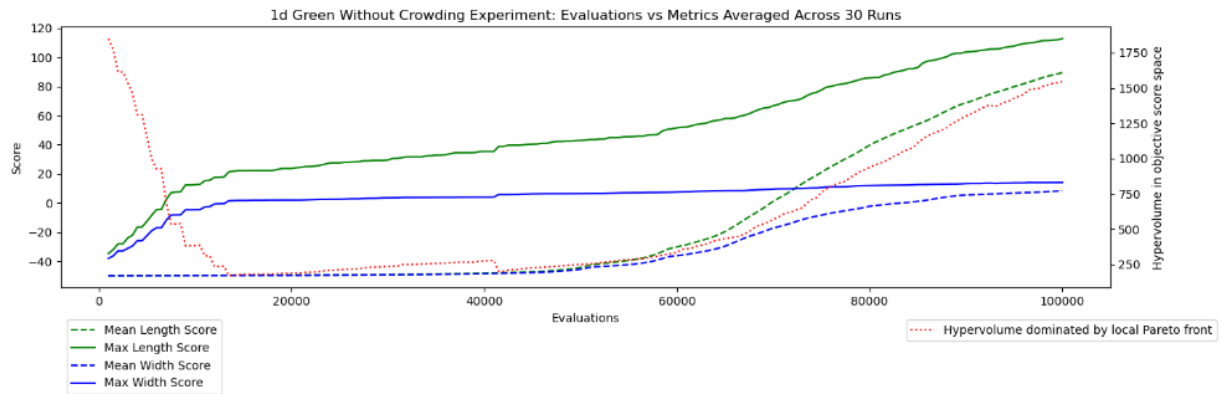


Jarrett Hill

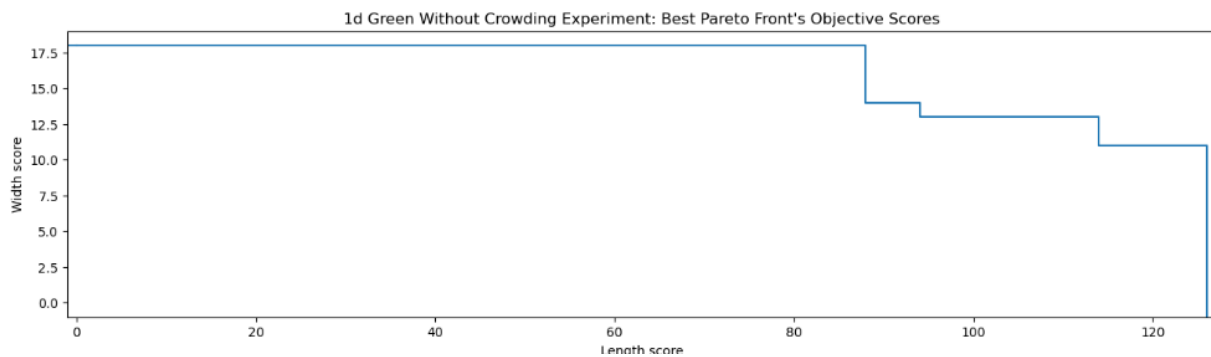
[Jwh0100@auburn.edu](mailto:Jwh0100@auburn.edu)

COMP 5660 Fall 2023 Assignment 1d

No crowding:

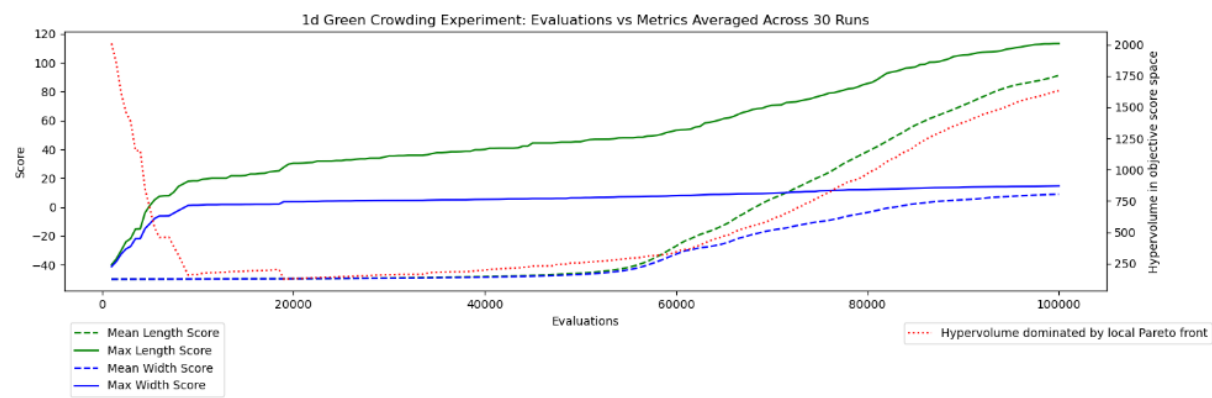


([88, 18], [94, 14], [114, 13], [126, 11])

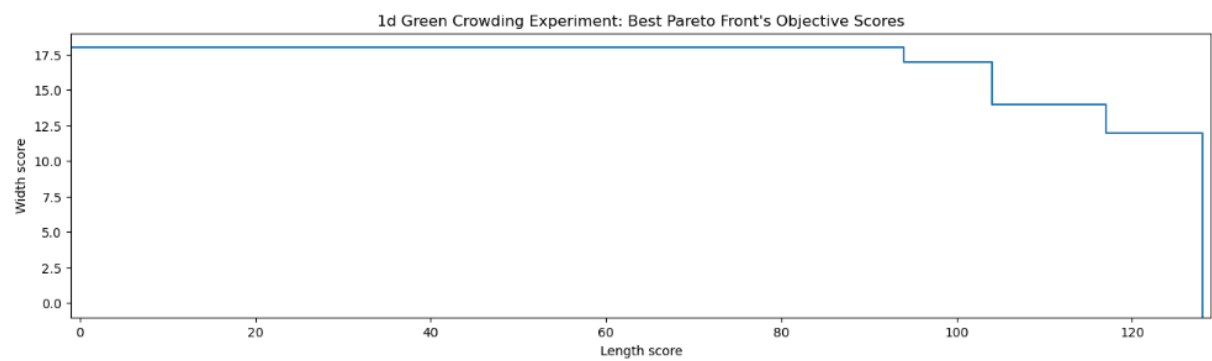


Parameter	Value
ea	
mu	1_000
num_children	500
mutation_rate	0.2
parent_selection	k_tournament_with_replacement
survival_selection	truncation
recombination_kwargs	
method	uniform
parent_selection_kwargs	
k	2
fitness_kwargs	
crowding	FALSE
yellow	FALSE
mutation_kwargs	
bonus	FALSE

With Crowding:



[[128, 12], [94, 18], [94, 18], [117, 14], [104, 17], [104, 17], [94, 18], [104, 17], [104, 17], [104, 17], [94, 18], [104, 17], [104, 17], [104, 17]]



Parameter	Value
ea	
mu	1_000
num_children	500
mutation_rate	0.2
parent_selection	k_tournament_with_replacement
survival_selection	truncation
recombination_kwargs	
method	uniform
parent_selection_kwargs	
k	2
fitness_kwargs	
crowding	TRUE
yellow	FALSE
mutation_kwargs	
bonus	FALSE

Statistical analysis:

alpha = 0.05

Without crowding data mean: 1546.4

Without crowding data stdv: 392.46371235725906

Crowding data mean: 1631.9666666666667

Crowding data stdv: 458.3483454176817

p-value: 0.4405716709165378

The p-value is greater than the alpha which indicates that these values are not statistically different which means that crowding vs no-crowding does not make a difference. I suspect that this is not true to real life and is more than likely due to some bug in my implementation or improper parameters. I think that the parameters I have set for my EA were just too random for crowding to make a big enough difference to reject the null hypothesis.

The two graphs of the best pareto front from each experiment look mostly the same which is to be expected as they have nearly the same hypervolumes (no-crowding: 2205 vs crowding: 2323)

I noticed that nearly half of my initial hypervolumes started at 2401 and continued to stay at that value until at least 1 valid individual was found.