ITERATED PRISONER DILEMMA GENETIC PROGRAMMING SEARCH
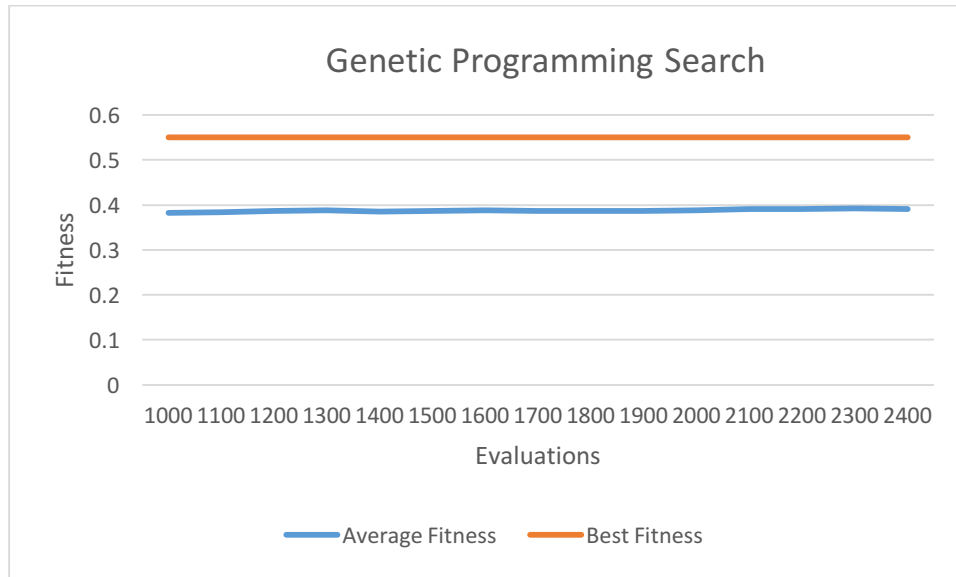## COMP SCI 5401 FS2017 Assignment 2b

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Data

Genetic Programming Search

(Chart: X-axis "Evaluations" ranging 1000 to 2400 in increments of 100; Y-axis "Fitness" ranging 0 to 0.6. Legend: Average Fitness, Best Fitness)

Statistical Analysis

F-Test Two-Sample for Variances

	Best Random	Average GP
Mean	0.560163985	0.395092813
Variance	2.99489E-05	7.39797E-05
Observations	30	30
df	29	29
F	0.404825289	
P(F<=f) one-tail	0.008774172	
F Critical one-tail	0.537399965	

Because the mean of variable 1 is greater than the mean of variable two, and F critical is greater than the F value, we can assume equal variances.

t-Test: Two-Sample Assuming Equal Variances

	Best Random	Average GP
Mean	0.561102131	0.395478462
Variance	3.75625E-05	7.18654E-05
Observations	30	30
Pooled Variance	5.4714E-05	
Hypothesized Mean Difference	0	
df	58	
t Stat	86.71992276	
P(T<=t) one-tail	2.24229E-63	
t Critical one-tail	1.671552762	
P(T<=t) two-tail	4.48458E-63	
t Critical two-tail	2.001717484	

Because the t stat is greater than the t critical two tail value, we can reject the null hypothesis that the mean difference is zero. This means that the best results from random search is statistically better than the average result from the genetic programming search. This is due to the fact that random search always found an optimal solution, but not every solution in the genetic programming search was optimal. If this was an average random search solution compared to an average genetic programming search solution, the genetic programming search would almost certainly be better.