

# COMP SCI 5401 FS2018 Assignment 2c

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## Methodology

Describe the custom parts of your EA design, such as your function and terminal sets, in sufficient detail to allow someone else to implement a functionally equivalent EA, and explain your EA design decisions.

## Experimental Setup

Provide your experimental setup in sufficient detail to allow exact duplication of your experiments (i.e., producing the exact same results within statistical margins) and justify your choice of EA strategy parameters.

## Results

List your experimental results in both tabular and graphical formats (box plots preferred) along with your statistical results, corresponding to the three configuration and log files, and six solution files, referenced above (so you'll have three plots and a table containing your statistical comparison of the three combinations).

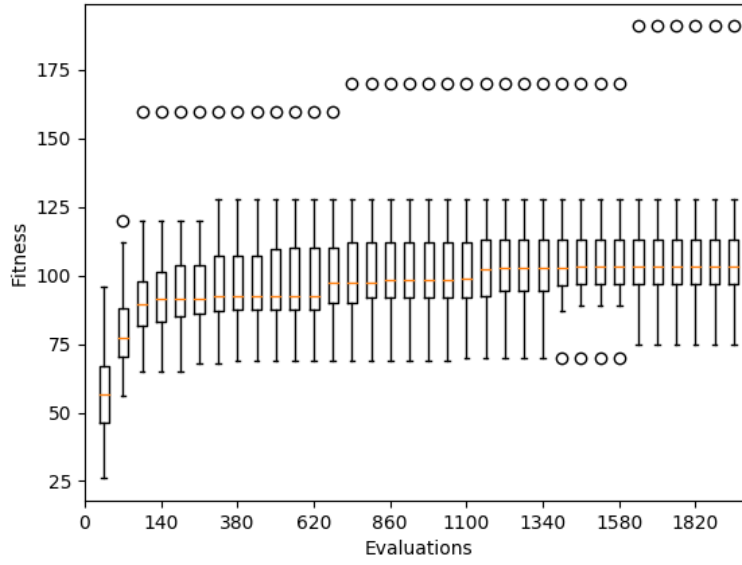


Figure 1: Global Best Fitness versus Fitness Evaluations for the **Overselection Parent Selection and k-Tournament Survival Selection (Deliverable 1)**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **deliverable1.cfg** configuration file.

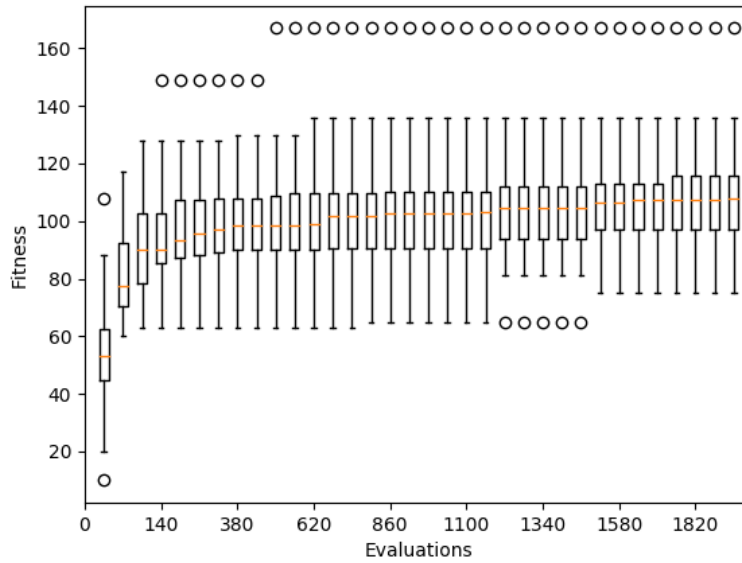


Figure 2: Global Best Fitness versus Fitness Evaluations for the **Fitness Proportional Parent Selection and k-Tournament Survival Selection (Deliverable 2)**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **deliverable2.cfg** configuration file.

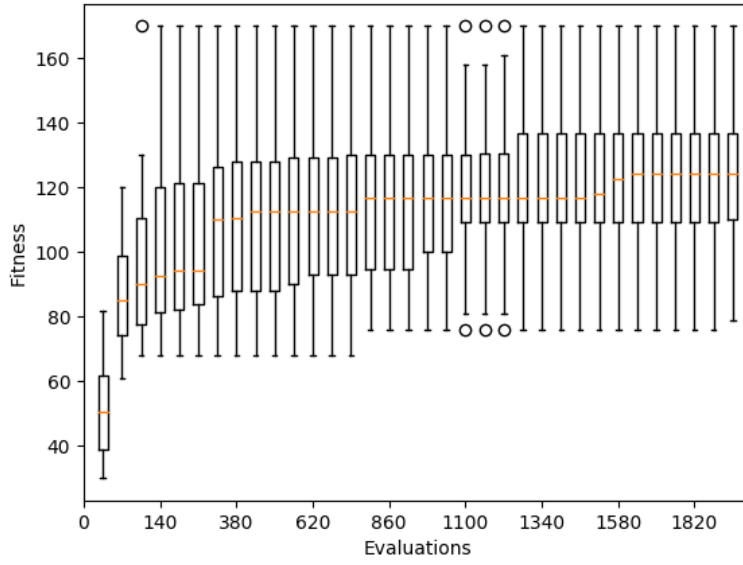


Figure 3: Global Best Fitness versus Fitness Evaluations for the **Overselection Parent Selection and Truncation Survival Selection (Deliverable 3)**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **deliverable3.cfg** configuration file.

Table 1: Statistical Analysis performed on Deliverable 1 and Deliverable 2

	deliverable1	deliverable2
mean	107.4	108.13333333333334
variance	395.5733333333333	301.58222222222224
standard deviation	19.88902544956221	17.366122832175932
observations	30	30
df	29	29
F	1.3116599858523932	
F critical	0.5373999648406917	
Equal variances assumed		
observations	30	
df	58	
t Stat	-0.14956692976611996	
P two-tail	0.8816251806191939	
t Critical two-tail	2.0017	
Nether deliverable2 nor deliverable1 is statistically better		

Table 2: Statistical Analysis performed on Deliverable 2 and Deliverable 3

	deliverable2	deliverable3
mean	108.13333333333334	124.56666666666666
variance	301.58222222222224	578.5788888888889
standard deviation	17.366122832175932	24.05366684912903
observations	30	30
df	29	29
F	0.5212465024456475	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	-2.9829335278061286	
P two-tail	0.004315231188237327	
t Critical two-tail	2.0395	
deliverable3 is statistically better than deliverable2		

Table 3: Statistical Analysis performed on Deliverable 1 and Deliverable 3

	deliverable1	deliverable3
mean	107.4	124.56666666666666
variance	395.57333333333333	578.5788888888889
standard deviation	19.88902544956221	24.05366684912903
observations	30	30
df	29	29
F	0.6836981800234675	
F critical	0.5373999648406917	
Equal variances assumed		
observations	30	
df	58	
t Stat	-2.961907970931727	
P two-tail	0.004425906472211853	
t Critical two-tail	2.0017	
deliverable3 is statistically better than deliverable1		

## Discussion

Discuss your experimental and statistical results, providing valuable insights such as conjectures you induce from your results. Your choice of what to report on and how you go about rationalizing it is your subjective interpretation.

## BONUS1

TODO

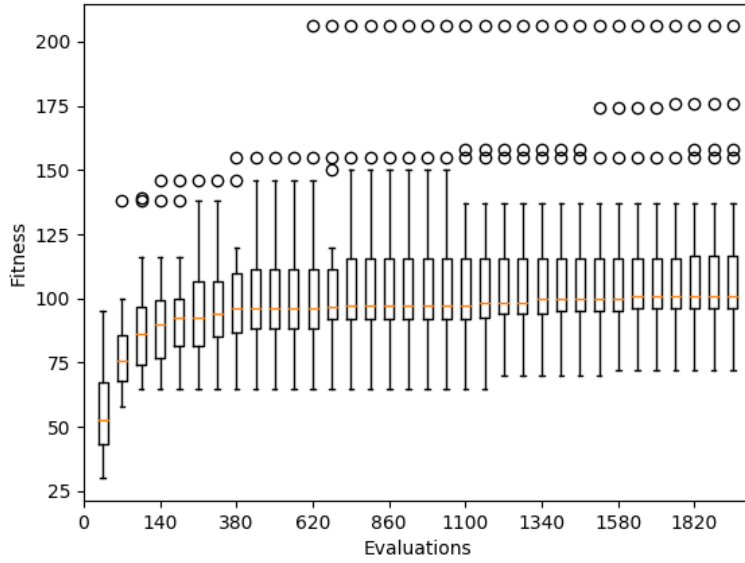


Figure 4: Global Best Fitness versus Fitness Evaluations for the **BONUS1: Single pac-man, multiple ghosts employing different controllers**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **BONUS1.cfg** configuration file.

Table 4: Statistical Analysis performed on BONUS1 and Deliverable 1

	BONUS1	deliverable1
mean	111.4	107.4
variance	862.0400000000001	395.5733333333333
standard deviation	29.360517706607286	19.88902544956221
observations	30	30
df	29	29
F	2.179216664419577	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	0.6074148757553575	
P two-tail	0.5462715238455983	
t Critical two-tail	2.0395	
Nether deliverable1 nor BONUS1 is statistically better		

## BONUS2a, BONUS2b, BONUS2c, and BONUS2d

TODO

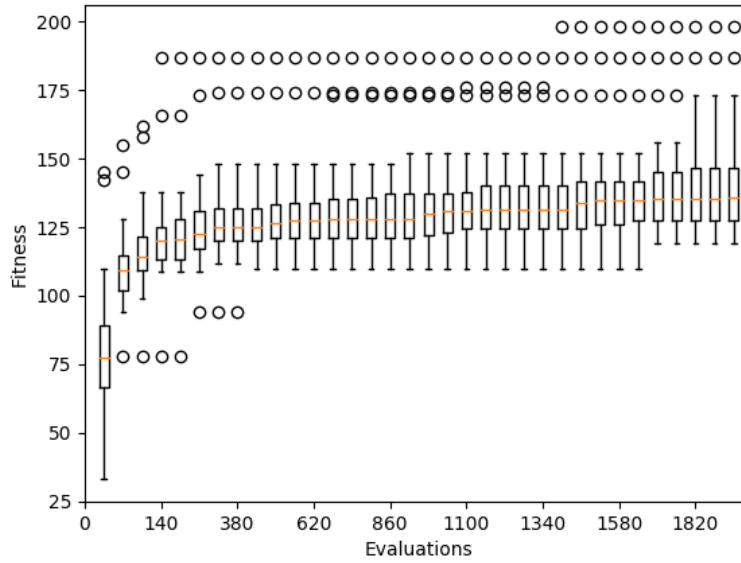


Figure 5: Global Best Fitness versus Fitness Evaluations for the **BONUS2a: Multiple pacmen employing the same controller, multiple ghosts employing the same controller**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **BONUS2a.cfg** configuration file.

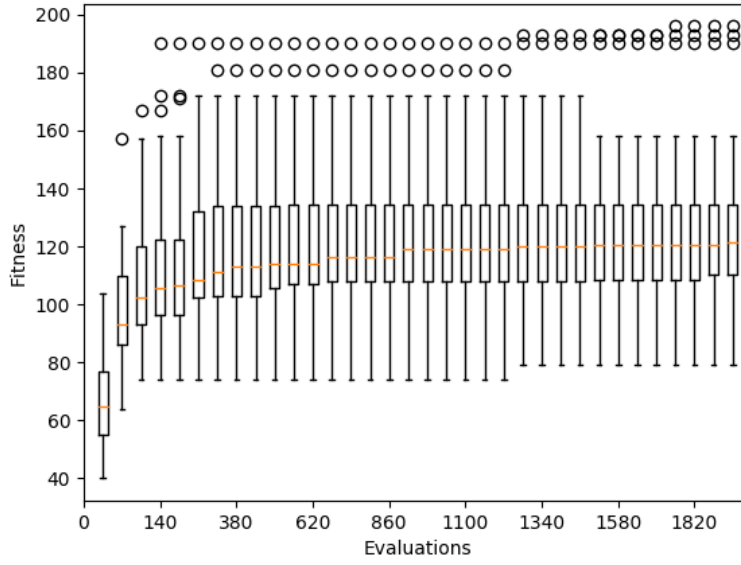


Figure 6: Global Best Fitness versus Fitness Evaluations for the **BONUS2b: Multiple pacmen employing different controllers, multiple ghosts employing the same controller**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **BONUS2b.cfg** configuration file.

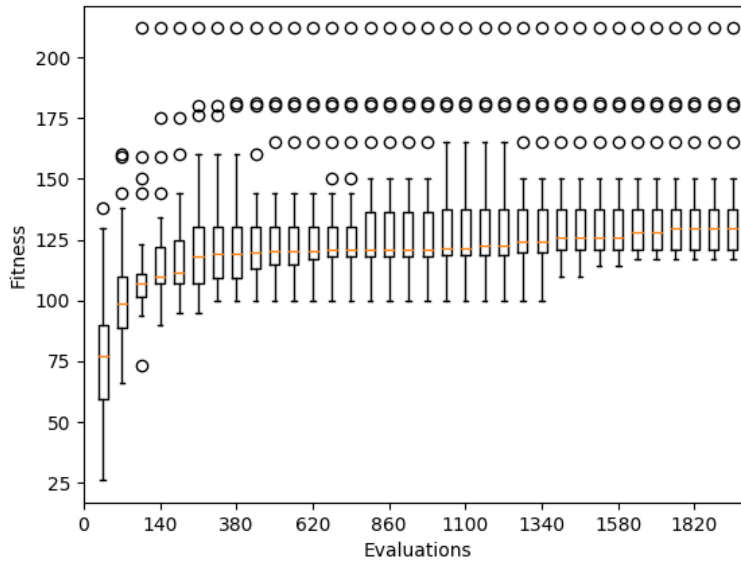


Figure 7: Global Best Fitness versus Fitness Evaluations for the **BONUS2c: Multiple pacmen employing the same controller, multiple ghosts employing different controllers**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **BONUS2c.cfg** configuration file.

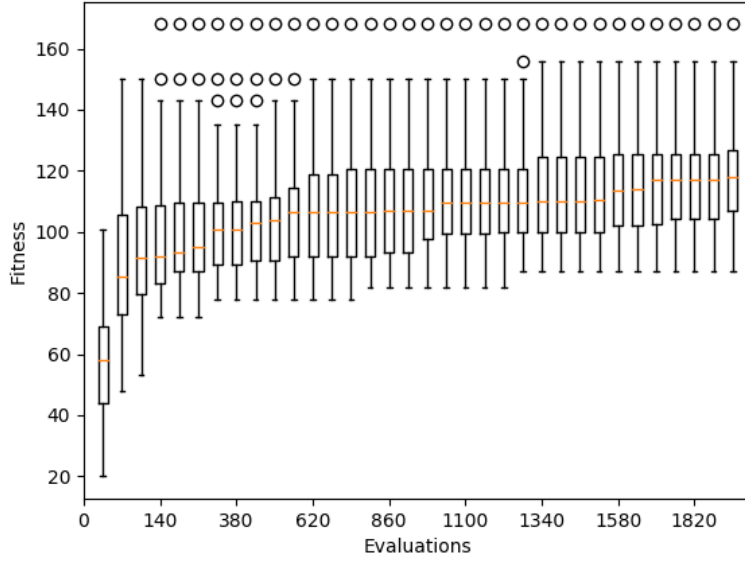


Figure 8: Global Best Fitness versus Fitness Evaluations for the **BONUS2d: Multiple pacmen employing different controllers, multiple ghosts employing different controllers**, Randomly Generated Worlds. The figure was generated with data obtained by running the GP with the **BONUS2d.cfg** configuration file.

Table 5: Statistical Analysis performed on BONUS2a and BONUS2b

	BONUS2a	BONUS2b
mean	140.7	127.6
variance	342.47666666666663	784.9733333333332
standard deviation	18.506125112153182	28.017375561128727
observations	30	30
df	29	29
F	0.4362908294124641	
F critical	0.5373999648406917	
Equal variances assumed		
observations	30	
df	58	
t Stat	2.1009786982574874	
P two-tail	0.03999926723492717	
t Critical two-tail	2.0017	
BONUS2a is statistically better than BONUS2b		



Table 6: Statistical Analysis performed on BONUS2a and BONUS2c

	BONUS2a	BONUS2c
mean	140.7	135.9
variance	342.47666666666663	478.02333333333337
standard deviation	18.506125112153182	21.8637447234762
observations	30	30
df	29	29
F	0.7164434093175367	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	0.9024038585626759	
P two-tail	0.3706762522069167	
t Critical two-tail	2.0395	
Nether BONUS2c nor BONUS2a is statistically better		

Table 7: Statistical Analysis performed on BONUS2a and BONUS2d

	BONUS2a	BONUS2d
mean	140.7	119.36666666666666
variance	342.47666666666663	354.3655555555555
standard deviation	18.506125112153182	18.82459974489645
observations	30	30
df	29	29
F	0.9664502130568247	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	4.352016063471005	
P two-tail	5.5455771508607214e-05	
t Critical two-tail	2.0395	
BONUS2a is statistically better than BONUS2d		

Table 8: Statistical Analysis performed on BONUS2b and BONUS2c

	BONUS2b	BONUS2c
mean	127.6	135.9
variance	784.9733333333332	478.02333333333337
standard deviation	28.017375561128727	21.8637447234762
observations	30	30
df	29	29
F	1.6421234667763773	
F critical	0.5373999648406917	
Equal variances assumed		
observations	30	
df	58	
t Stat	-1.2576968962023538	
P two-tail	0.2135417162246614	
t Critical two-tail	2.0017	
Nether BONUS2c nor BONUS2b is statistically better		

Table 9: Statistical Analysis performed on BONUS2b and BONUS2d

	BONUS2b	BONUS2d
mean	127.6	119.36666666666666
variance	784.9733333333332	354.3655555555555
standard deviation	28.017375561128727	18.82459974489645
observations	30	30
df	29	29
F	2.2151513346230667	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	1.313554924158955	
P two-tail	0.1949035354931222	
t Critical two-tail	2.0395	
Nether BONUS2d nor BONUS2b is statistically better		

Table 10: Statistical Analysis performed on BONUS2c and BONUS2d

	BONUS2c	BONUS2d
mean	135.9	119.36666666666666
variance	478.02333333333337	354.36555555555555
standard deviation	21.8637447234762	18.82459974489645
observations	30	30
df	29	29
F	1.348955410138307	
F critical	0.5373999648406917	
Unequal variances assumed		
observations	30	
df	31	
t Stat	3.086002570767297	
P two-tail	0.0031343644838580814	
t Critical two-tail	2.0395	
BONUS2c is statistically better than BONUS2d		

## Conclusion

Conclude your report by stating your most important findings and insights in the conclusion section.

## Bibliography

This is where you provide your citation details, if you cited anything. Only list references here that you actually cite in your report.

## Appendices

If you have more data you want to show than what you could reasonably fit in the body of your report, this is the place to put it along with a short description.