# G52AIM CW1 REPORT

## QUESTION 1.

An improvement could be using equivalent values (values that are equal or greater than the current value)

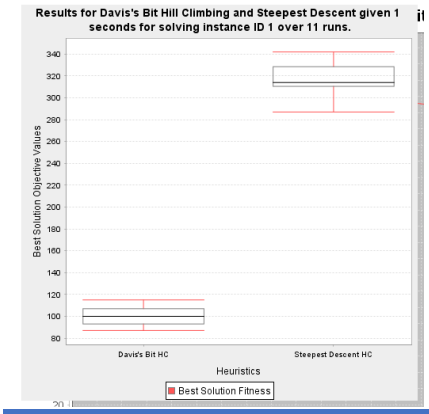
## QUESTION 2.

Davis's Bit Hill Climbing Heuristic is stochastic which means it takes random values to generate a result. In the first implementation, if the value is smaller than the current value, it forces that value to change however in this new implementation the value wouldn't update if the current value is same. That means the value could be locked in a certain interval of values which would increase the distribution and makes the optimal point hard to find. Or in other words the algorithm will have a wider landscape to check.

## QUESTION 3.

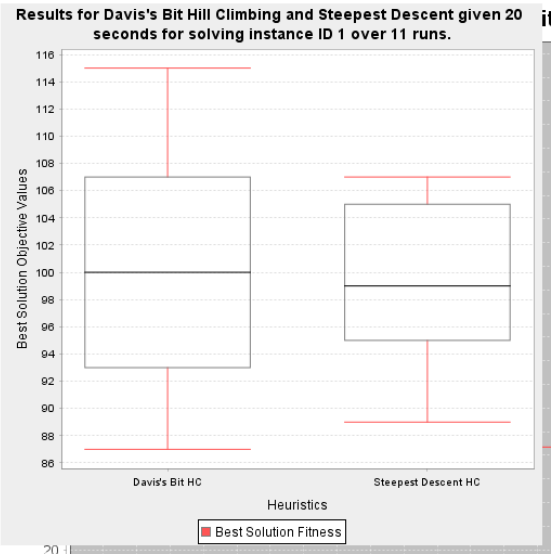
Steepest Descent focuses on the path with the steepest descent which means it focuses on neighbours that are located on the steepest gradient unlike DBHC which is stochastic. Therefore, the improvement we made wouldn't affect SDHC since the landscape will be roughly in same size.

## QUESTION 4.

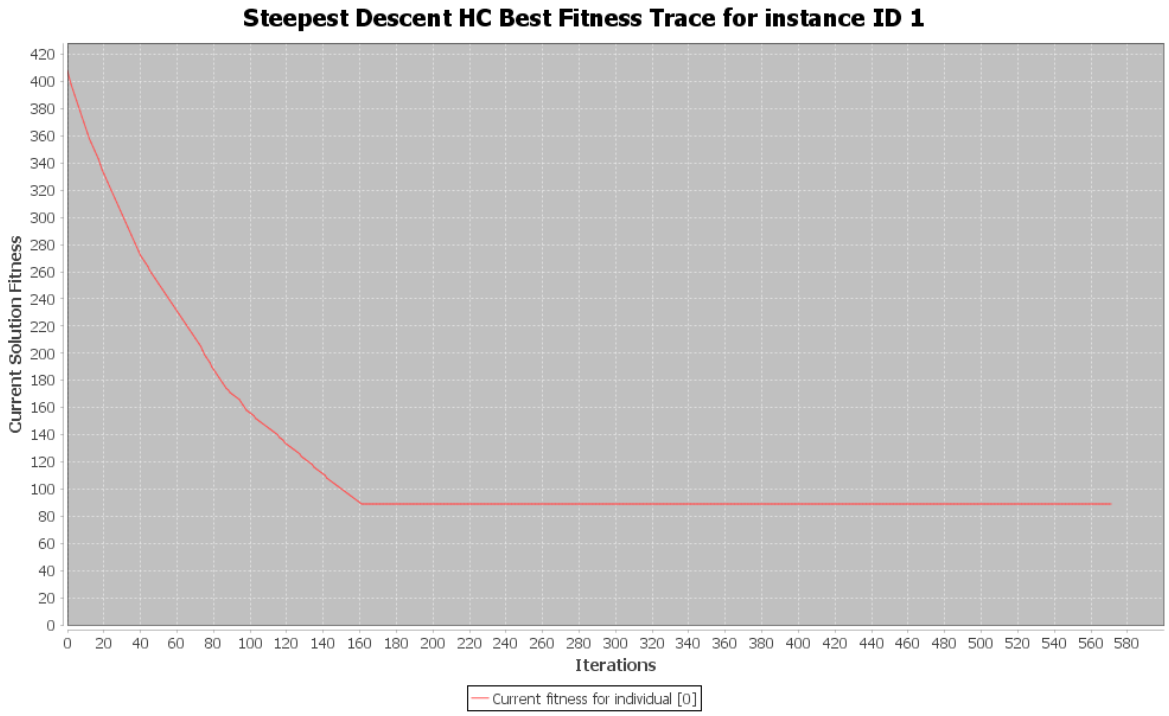


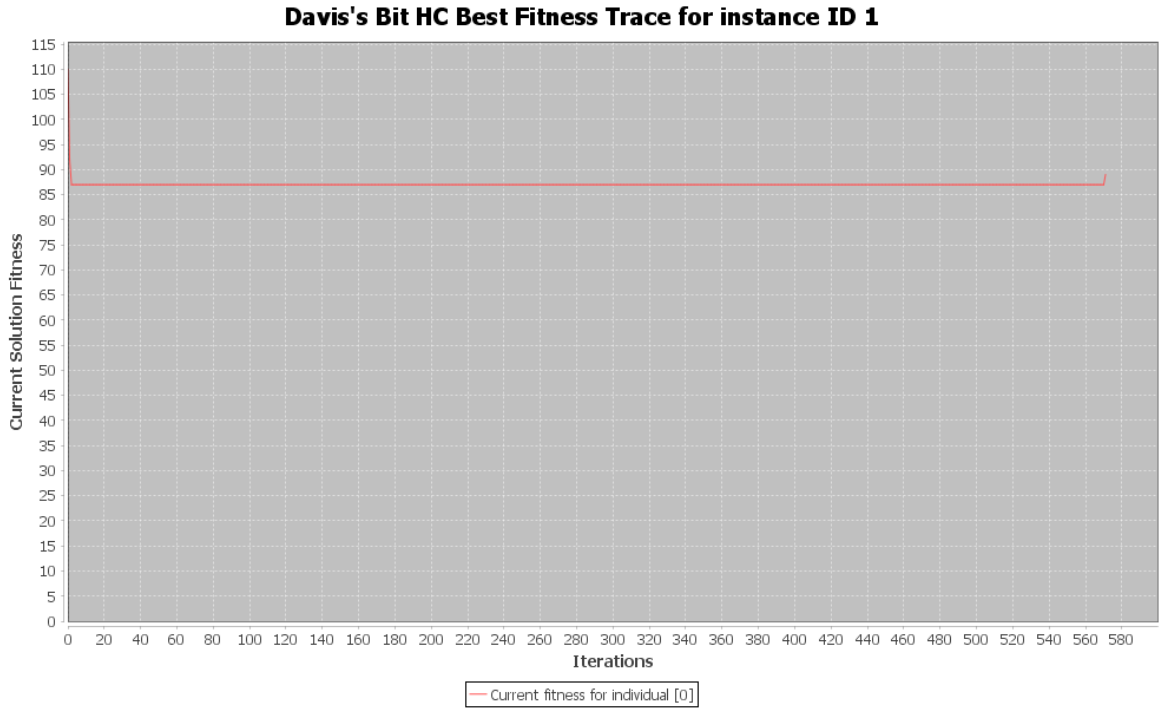

Both algorithms are trying to find the minimum point. In this case Davis's Algorithm is better because it managed to compute a lower value compared to Steepest decent (Steepest decent is probably locked in a local minimum). Apart from those the box plot shows that the solution generated by Davis's algorithm is more normally distributed (distance between quartiles, mean and percentiles are roughly same). Similarly, the uncertainty for Davis's graph is much smaller compared to SDHC since the distance between the quartiles and percentiles (red lines) are shorter (smaller landscape).

## QUESTION 5.




DBHC is more normally distributed and it could generate a value with lesser number of iterations (with respect to the Trace graph below) however in this case the quartiles and percentiles of DBHC are more widespread which means the result is less precise since the landscape is greater. Considering these factors SDHC is better in this case since it managed to compute a smaller value (more accurate) and it is more precise since it works on a smaller landscape. The only disadvantage of SDHC is the fact that it requires more iterations to achieve the final answer.


Steepest Descent HC Best Fitness Trace for instance ID 1
Current Solution Fitness
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420
Iterations
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580
Current fitness for individual [0]


Davis's Bit HC Best Fitness Trace for instance ID 1
Current Solution Fitness
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115
Iterations
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580
Current fitness for individual [0]