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**What happens when you vary the following parameters? Why?**

1. PATH\_LEN (the number of directions in the gene). Try 1\*WORLD\_DIM, 2\* WORLD\_DIM, and 3\*WORLD\_DIM.  
   1. Lowest cost in the 20’s, jumps about 9 times, relatively no cross edges
   2. Lowest cost in the 40’s, jumps about 11 times, runs into cross edges
   3. Lowest cost in the 90’s, jumps about 9 times, has cross edges and back edges

It appears that as one increase the path length the minimum cost increases. It also becomes more and more difficult to find a path that doesn’t cross edges and that doesn’t follow the same edges twice.

This stands to reason because as the path length increases there is simply more distance to cover and therefore the cost will naturally increase for this reason. Also as the path gets longer it begins to search more of the possible space, which would also naturally make it more difficult to find a path that doesn’t visit an also ready visited edge.

1. NUM\_GENES (the number of different genes considered). Try 10, 50, and 100.

10) Lowest cost in the 70’s, jumps about 6 times, sometimes one cross edge  
50) Lowest cost in the 60’s, jumps about 4 times, no cross edges   
100) Lowest cost in the 50’s, jumps 7 times, cross edges  
  
It appears that as one increases the number of genes one effectively increase the search space. The more possibilities one is able to try the more likely one is to find a better result. Therefore, the data appears to show that as the number of different genes being considered increases the lowest cost of a path found also decreases. In other words, increasing the number of genes considered helped the algorithm find a better solution because it was able to consider a lot more gene configurations.

1. MAX\_GENERATIONS (how many generations the code runs). Try 30, 60, and 120.  
     
   30) Lowest cost in the 60’s, jumps 5 times, occasional cross edge  
   60) Lowest cost in the 50’s, jumps 5 times, occasional cross edge  
   120) Lowest cost in the 40’s, jumps 6 times, occasional cross edge  
   Jumps a lot more in the beginning, indicating that it takes a lot more work for a smaller and smaller improvement to cost.   
     
   It appears that increasing the number of generations that the code runs had a similar effect as increasing the number of genes considered. As the number of generations increased the cost of our solution decreased. This is because our algorithm was able to try a lot more solutions and had more time to find a smaller cost solution.