Traveling Sales Person

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- **Genetic Algorithms Approach:**

Condition for stopping:

Reaching the maximum iteration which is considered 1000.

Problem parameters:

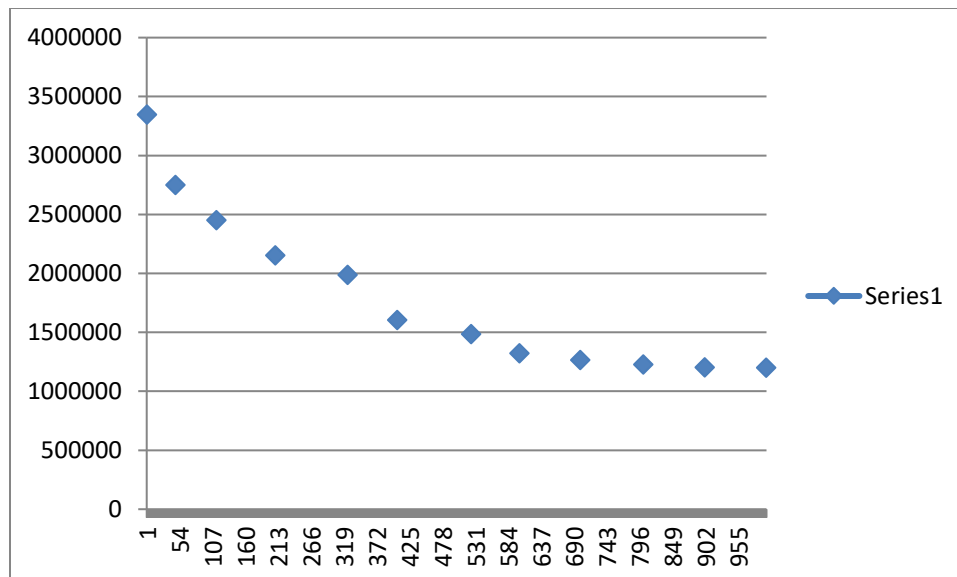**P crossover = 0.9 - P mutation 0.02 - P replacement = 0.9 Population = 100**

Data:

GA- Ali535

Diagram of the bestsolution s by generations

Best Solutions Scores:

1199801.0

Mean Solution Scores :

1242001.0

Worst Solutions Scores :
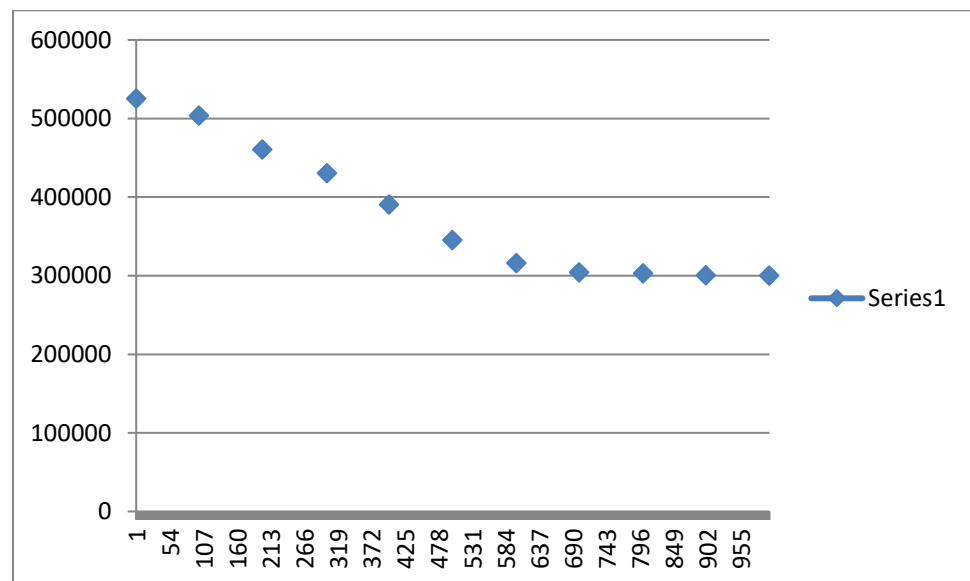
1312785.0

Best Chromosome :

[334 90 183   1 436 216 181 108 353 213 319 131 245 352 163 360 172 165

 204 130 ... 125 77 345 299 347 491 13 240 473 22 137 101 219]

DATA:

GA- d2103:

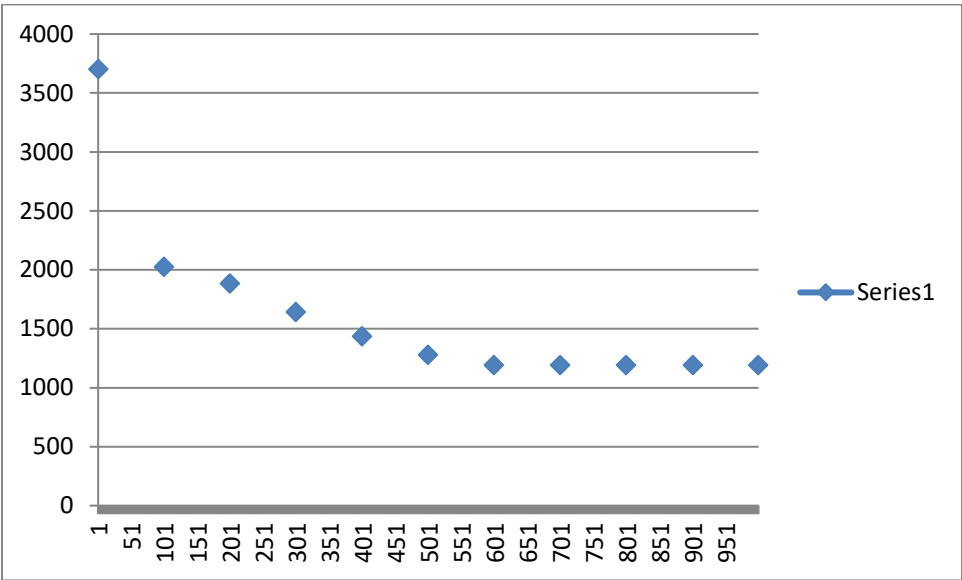
Best Solutions Scores:

299912.799

Mean Solutions Scores:

276317.272

Worst Solutions Scores:

310629.143

DATA:

GA- bayg29:

Best Solutions Scores:

1810.0

Mean Solutions Scores:

1822.02040816

Worst Solutions Scores:

1884.0

Best Chromosome:

[20 23 7 26 22 15 18 9 19 1 28 2 25 4 8 11 5 27 0 12 3 14 17 13 16

 21 10 24 6]

Changing the parameters for bayg29 :

We changed the replacement probability of the previous generation from 90% to 80 ⁒ .Each time the best-fit chromosomes of the previous generation are kept, i.e instead of keeping 10% of the best, 20% of the best of the previous generation were kept. We also changed the mutation from 0.02 to 0.1 and change the crossover probability from 0.9 to 0.95 causing changes in the best solution and keeping the bettersolutions of the previous generations by 10% more. The possibility of crossover somehow creates more balance between exploration and exploitation. It is also worth mentioning that an increase in the mutation rate prevented the algorithm from getting stuck in local optimal points.
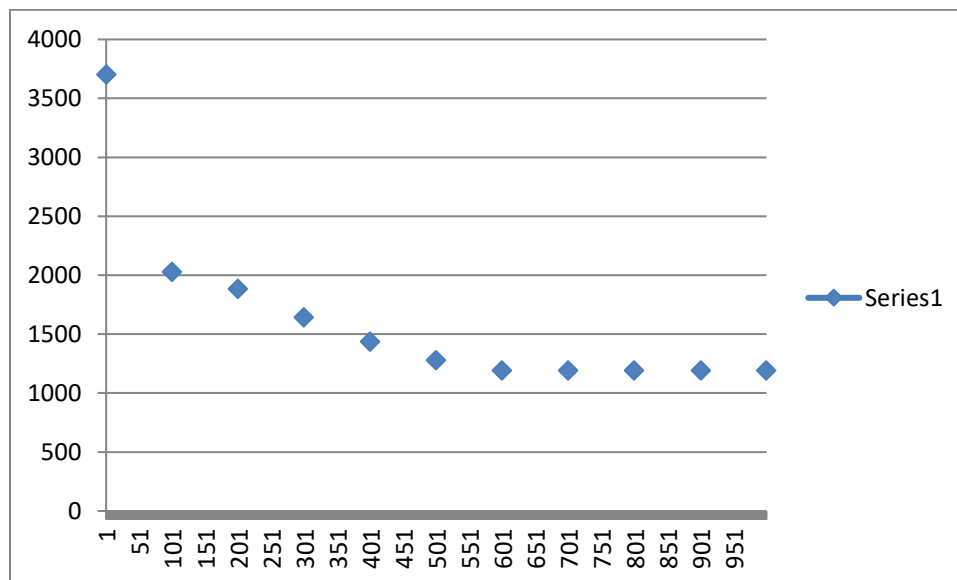
For asymmetric mode, since the structure of the program stores the distances in a matrix and it is possible to access the distance j to i in the same way as i toj In . the fit calculation, the distance is calculated according to the path stored in each ,chromosome. Therefore, no change was made in the implementation of the code and the graph of the results for the best solution:s is as follows.
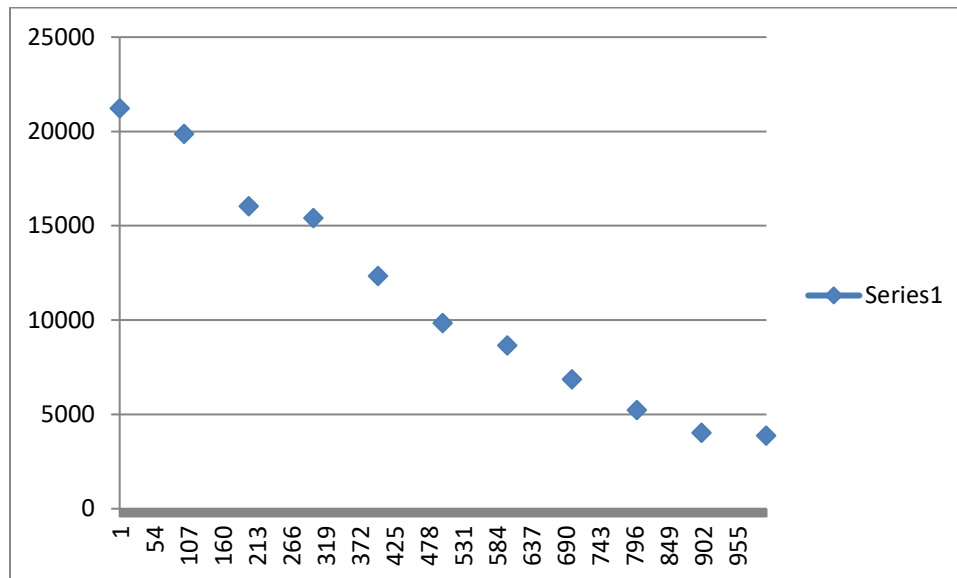
• Ant Colony System approach:

For the **ali535** and **bayg29** datasets results were significantly different from those obtained from GA. So in both cases the found tour had a different fit equivalent.

Also, in terms of run time, by doing only 20 iterations the algorithm converged and reached the optimal solution.

For **bayg29**, in the first iteration the cost of the tour was found to be equal to the optimal number stated in the problem, i.e. 1610.

For **Ali535** the value of the tour was found equal to 202812 which was very close to the number stated in the problem.