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Observation:

Case 1:

Mutation Rate	Initial Population	Best case(In generations)	Exact match with candidate
0.015	30	44	Y
0.015	60	28	Y
0.015	90	22	Y
0.015	120	21	Y
0.015	150	18	Y
0.015	180	17	Y

Case 2:

Mutation Rate	Initial Population	Best case(In generations)	Exact match with candidate
0.005	30	51	Y
0.005	60	34	Y
0.005	90	20	Y
0.005	120	17	Y
0.005	150	17	Y
0.005	180	16	Y

Case 3:

Mutation Rate	Initial Population	Best case(In generations)	Exact match with candidate
0.05	30	221	Y
0.05	60	114	Y
0.05	90	106	Y
0.05	120	82	Y
0.05	150	63	Y
0.05	180	75	Y

Case 4:

Mutation Rate	Initial Population	Best case(In generations)	Exact match with candidate
0.0005	30	328	N
0.0005	60	125	N
0.0005	90	53	N
0.0005	120	18	N
0.0005	150	16	N
0.0005	180	15	N

Conclusion:

We observed that our code provided an optimum solution when Mutation Rate = 0.005. At this rate, we always find the best match for the candidate. At the same mutation rate as we are increasing the initial population we are getting the best case results.

Also, we observed that when we deviate Mutation Rate(0.005) by +-200%, we are getting an exact match with the candidate. But with respect to the population, there are huge changes in best case results.

Also at very low Mutation Rate = 0.0005, we are not getting an exact match with the candidate while best case result increases with increase in population.

Output:

Mutation Rate = 0.005

Population = 50

```
================================================================
Solution found by different threads in ascending order:
Genertion: 31
Genertion: 40
Genertion: 45
Genertion: 54
Genertion: 60
****************************************************************
Minimum generation count to produce desired result : 31
****************************************************************
BUILD SUCCESSFUL (total time: 1 second)
```

Test Case:

Class : Algorithm

```
Testsuite: info6205.finalProject.geneticAlgorithm.AlgorithmTest
BinaryToString
algorithm
BinaryToString
BinaryToString
Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.094 sec

------------- Standard Output ---------------
BinaryToString
algorithm
BinaryToString
BinaryToString
------------- ---------------- ---------------
```

Class : Individual

```
Testsuite: info6205.finalProject.geneticAlgorithm.IndividualTest
generateIndividual
getFitness
setDefaultLength
Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.079 sec

------------- Standard Output ---------------
generateIndividual
getFitness
setDefaultLength
------------- ---------------- ---------------
```

Class : RandomGeneration_GA

```
Testsuite: info6205.finalProject.geneticAlgorithm.RandomGeneration_GATest
stringToBinary
01100001011011000110011101101111011100100110100101110100011010000110110 1
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.098 sec

------------- Standard Output ---------------
stringToBinary
01100001011011000110011101101111011100100110100101110100011010000110110 1
------------- ---------------- ---------------
```