

Intro. to AI: Assignment

Genetic Algorithm

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Max Score Attained: 20 out of 20

1) Pseudo Code of used Genetic Algorithm:

```
6 '''
7 1- INITIALIZE POPULATION
8 2- EVALUATE POPULATION
9 3- WHILE CONDITION NOT SATISFIED:
10 4-     REPRODUCE INDIVIDUALS
11 5-     MUTATE INDIVIDUALS
12 6-     EVALUATE POPULATION
13 '''
```

2) Approaches Used:

1. GA without any optimizations
2. GA with initial generation optimizations
3. GA with Elite/Peasant optimizations

Note: Approaches are briefly discussed in next section.

Results: I was able to achieve *maximum possible score* (20 out of 20) with the third approach. Although 18 is the most frequently occurring score in my final implementation however, 20 can also be reproduced any time by just trying for 3 to 4 times.

3) Approaches' description

A) GA without any optimizations

This was my first attempt to solve the problem. I did not use any optimizations in this, my very first attempt. This was pretty straightforward as the pseudo code in section 1 describes. I was able to achieve 15 out of 20 scores in this attempt.

B) GA with initial generation optimizations

This was my second attempt and I was able to raise my score from 15 to 17 by this approach. Basically, I tailored out the bad individuals from my first generation – randomly generated generation. Bad Individuals mean the one trying to go out of bound of the region and ending up with no-action as a response. Such individuals were modified randomly to become relatively fit. The attempt to start off with relatively fit individuals actually paid off and as already said, I was able to achieve 17 out of 20.

C) GA with elite/peasant optimizations

This was my final approach as I was able to achieve maximum possible score by this. In this, at each new step to evaluate the population, I replaced the peasant candidate with the elite candidate. The peasant candidate is the one with lowest fitness value and the elite candidate is the one, as the name implies, the one with highest fitness value. This approach was taken from a thread on Quora. The approach is pretty successful as the elite candidates get to dominate the population and hence, the new generations get more fit. My final score attained by this approach is 20 by 20.

4) Approaches' visual representation:

Below is the graph showing the max fitness achieved vs the approach. Graph shows absolute progress with the highest value attained in final approach.



