DEPARTMENT *of* COMPUTING
College of Business & Technology
EAST TENNESSEE STATE UNIVERSITY

CSCI 5260 – Artificial Intelligence
Lab 3 – Beyond Classical Search

Overview

You may want to review the code for search.py, in the aima-python repository for additional context.

Code Exploration

- Download the **genetic_search_example.py** file from the D2L dropbox. This requires the following Python libraries (some of which you may need to install using pip install).
  1. os
  2. operator
  3. math
  4. random
  5. time
  6. copy → deepcopy

Genetic Algorithm Understanding

1. Run the code and examine it to explain each of the following. In your explanation, also note why the particular strategy might make sense for this problem.

Initialization Strategy	
Selection Strategy	
Reproduction Strategy	
Mutation Strategy	

2. Given the field sizes of 10x10, 20x20, and 30x30, what are the minimum possible fitness value? (Always assume the upper left is the starting location and the lower right is the ending location).

Code Performance

3. Alter the code to run the GA with the varying parameters, and fill in the following table. Try to get the best possible results. Note that the start location is always 0,0, but the end location should be (SIZE-1, SIZE-1).

Field Size	# Generations	Population Size	Mutation Rate	Lowest Fitness	Generation Lowest Fitness Reached	Method Timing
10x10						
20x20						
30x30						

Show which runs found the optimal solution.

Updated Code

4. Update the following within the code:
   a. Change the GA selection strategy to be purely random.
   b. Change the GA reproduction strategy to a different method (I suggest multipoint crossover).
5. Given your changes to the strategy, rerun the code as necessary to fill in the following table:

Field Size	# Generations	Population Size	Mutation Rate	Lowest Fitness	Generation Lowest Fitness Reached	Method Timing
10x10						
20x20						
30x30						

Submission

Create a Word Document named **SurnameLab3.docx** with your responses above.

Submit your altered code in file **genetic_search_example.py**.

Submit to the Lab 3 dropbox at or before Monday, February 8, 2021 by 11:59 PM.

Grading

A letter grade will be assigned for each response. The letter grades are based on both correctness and the adequacy of answers. Points are assigned as follows:

		A	B	C	D	F	Zero
		Excellent	Above Average	Average	Below Average	Poor	No Attempt
		10	8	6	4	2	0
GA Understanding	Q1						
	Q2						
Code Performance	Q3						
Updated Code	Q4						
	Q5						