CSE 4082 – Project #2

(Due 22.01.2022 at 23:59, electronic submission only, to cse.cse482@gmail.com)

In this project, you are going to implement an AI player for the well-known 2048 single-player sliding block puzzle game designed by Italian web developer Gabriele Cirulli. The rules of the game can be found in [1].

For the AI player, you are required to implement expectimax algorithm with MAX and CHANCE node layers with at least four evaluation (heuristic) methods.

In your project, you have to provide the following outputs:

Max Tiles Found				
	Heur 1	Heur 2	Heur 3	Heur 4
1-ply				
2-ply				
3-ply				
4-ply				

Min Tiles Found				
	Heur 1	Heur 2	Heur 3	Heur 4
1-ply				
2-ply				
3-ply				
4-ply				

Average of the 20 Tiles Found				
	Heur 1	Heur 2	Heur 3	Heur 4
1-ply				
2-ply				
3-ply				
4-ply				

For filling the above two tables, you have to play the game 20 times for each configuration and report the minimum tile found, the maximum tile found, and the average of the tiles found. In 1-ply, you search three consists of single MAX node level, in 2-ply, MAX-CHANCE-MAX level nodes, in 3-ply, MAX-CHANCE-MAX-CHANCE-MAX level nodes, and finally in 4-ply MAX-CHANCE-MAX-CHANCE-MAX-CHANCE-MAX level nodes.

Notes:

a. Details of the project will be discussed in the class.

b. In 2048 game, either 2 tile or 4 tile is placed in an empty square with equal probability for each empty square. However, the probability of a 2 tile occurring in an empty square is 0.9 whereas the probability of a 4 tile occurring in an empty square is 0.1. You should consider these values for calculating the values of chance nodes.

c. The project should be done in groups of two or three.

d. You may use any 2048 game source code available from the Internet. (For instance: https://github.com/bulenkov/2048). You are not allowed to use any source code from the Internet for the AI player part.

e. You should also submit a design document describing the classes (fields and methods) used in the project. The document should also contain the required tables and the description of the heuristic methods.

f. For each configuration, you should take a screenshot of the best play and submit them inside the document! If you do not present your outputs in the document, you will get the minimum grade!

g. Do not submit separate output file, embed the outputs in the design document!

h. Do not submit any executable file. Submit only source code and design document (with outputs).

i. Read this document again in case you skip something after you complete your project!

References:

[1] 2048 (video game), https://en.wikipedia.org/wiki/2048_(video_game).