CS4023D: Artificial Intelligence

Assignment 1

Name : Bhukya Vasanth Kumar
Roll : B180441CS
SEM - 7, CSE : A - Batch
Date : Oct 31, 2021

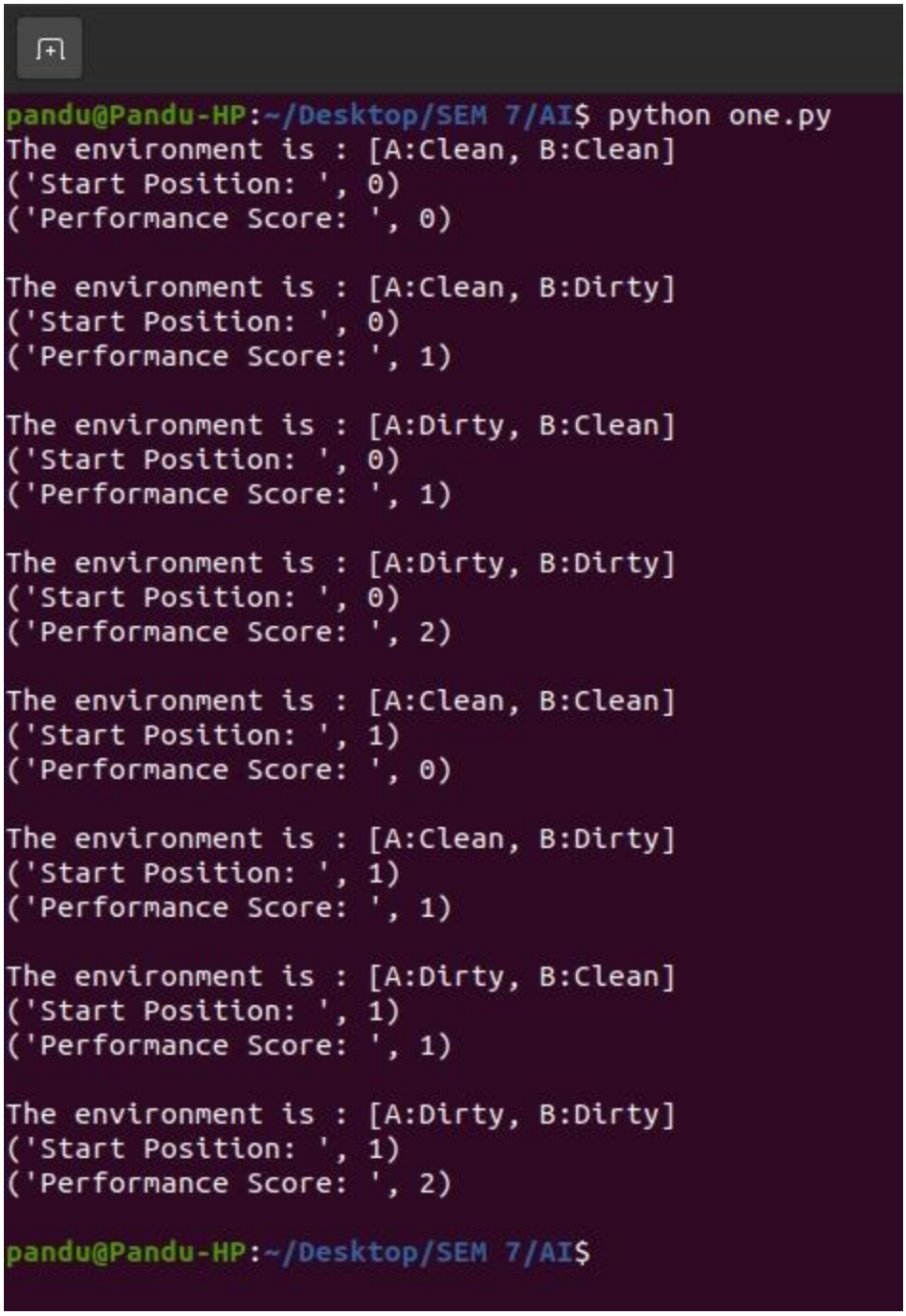
1) Stimulator

Given assumptions :

- The performance measure awards one point for each clean square at each time step, over a *lifetime" of 1000 time steps.
- The *geography* of the environment is known a priori but the dirt distribution and the initial location of the agent are not. Clean squares stay clean and sucking cleans the current square. The Left and Right actions move the agent left and right except when this would take the agent outside the environment, in which case the agent remains where it is.
- The only available actions are Left, Right, and Suck,
- The agent correctly perceives its location and whether that location contains dirt.

I presume that the bot can tell whether a place is unclean or not, and it will randomly choose to go left or right from there. The bot is unable to move if it moves outside of the surroundings.

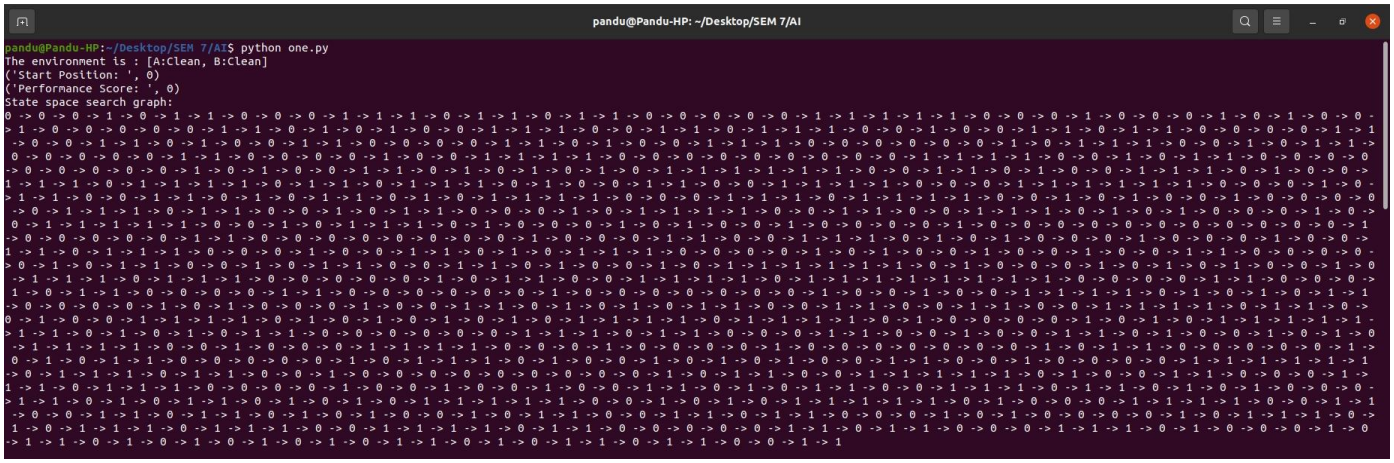
The following image is the output after running the stimulation for 1000 time steps.



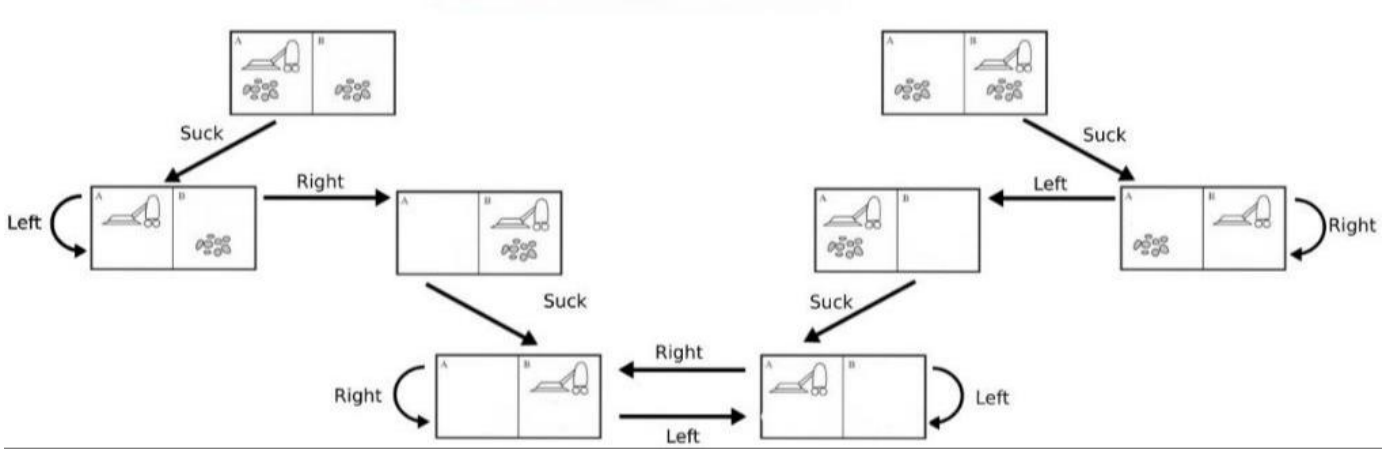
The outcome remains the same even after running it several times which implies that the saturation point has been reached.

Note: The outputs might be different if the time steps are less than saturation point.

The following image shows the sparse graph for the *case : Both A, B clean*



The following image displays the State Space Search Graph



2) Two Player Game

Developing a MiniMax algorithm based agent for the game.

Game: Consider a two player game. Assume there are some piles of stones. At each turn, a player can remove any number of stones from any single pile. A player loses, if there are no stones left on his turn. Also, the evaluation score of 1

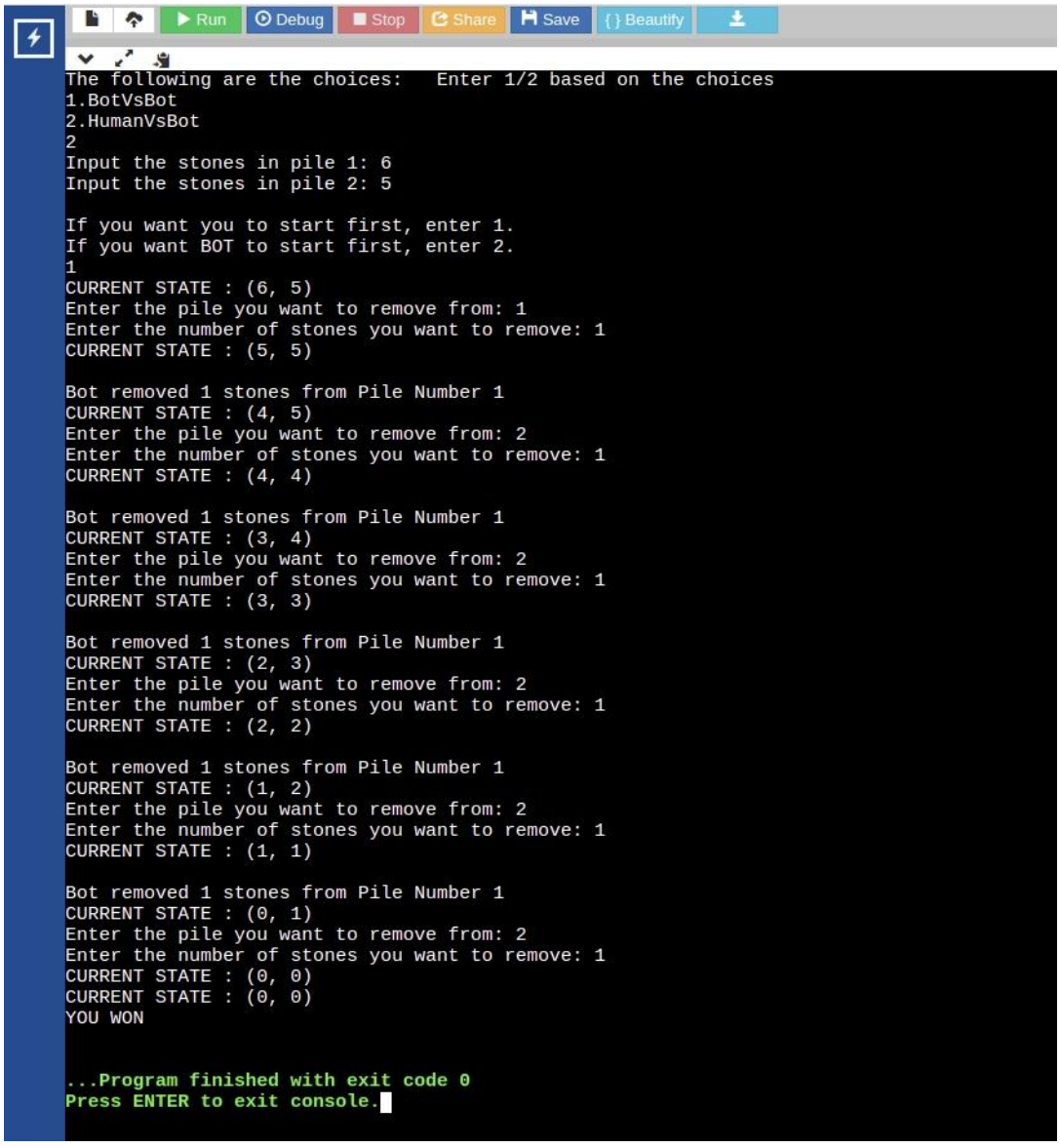
if Player 1 wins, -1 if Player 2 wins and 0 for a tie (if possible). Assume that both players play optimally. In the above game, it could result in 3 possible situations :

1. Human Vs Bot
2. Bot Vs Human
3. Bot Vs Bot

The conditions can be selected when the agent is running by opting 1 for Bot Vs Bot and 2 or 3 for a game between Human and the Bot.

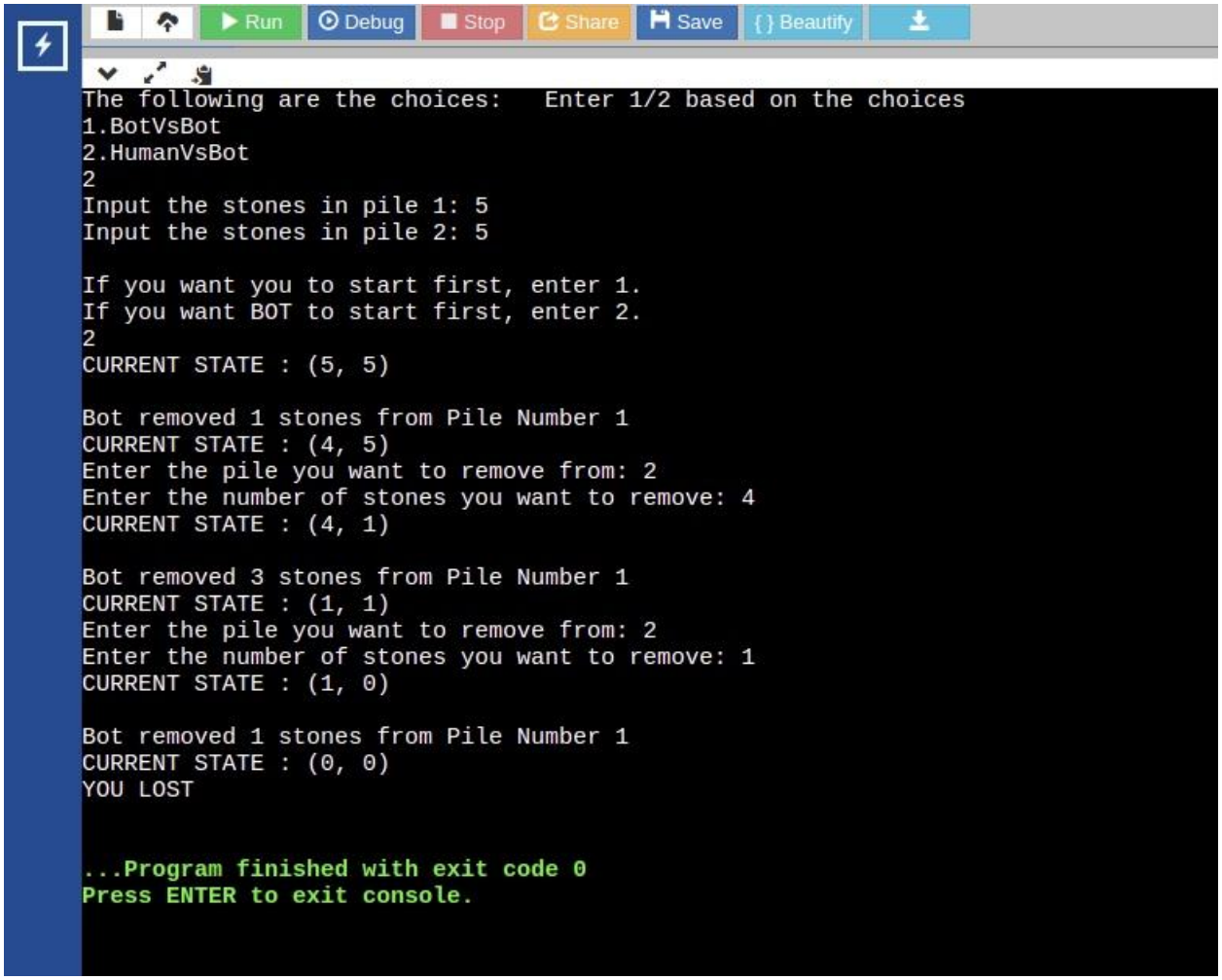
Following are the outputs for various cases.

1. **<u>Human Vs Bot</u>**



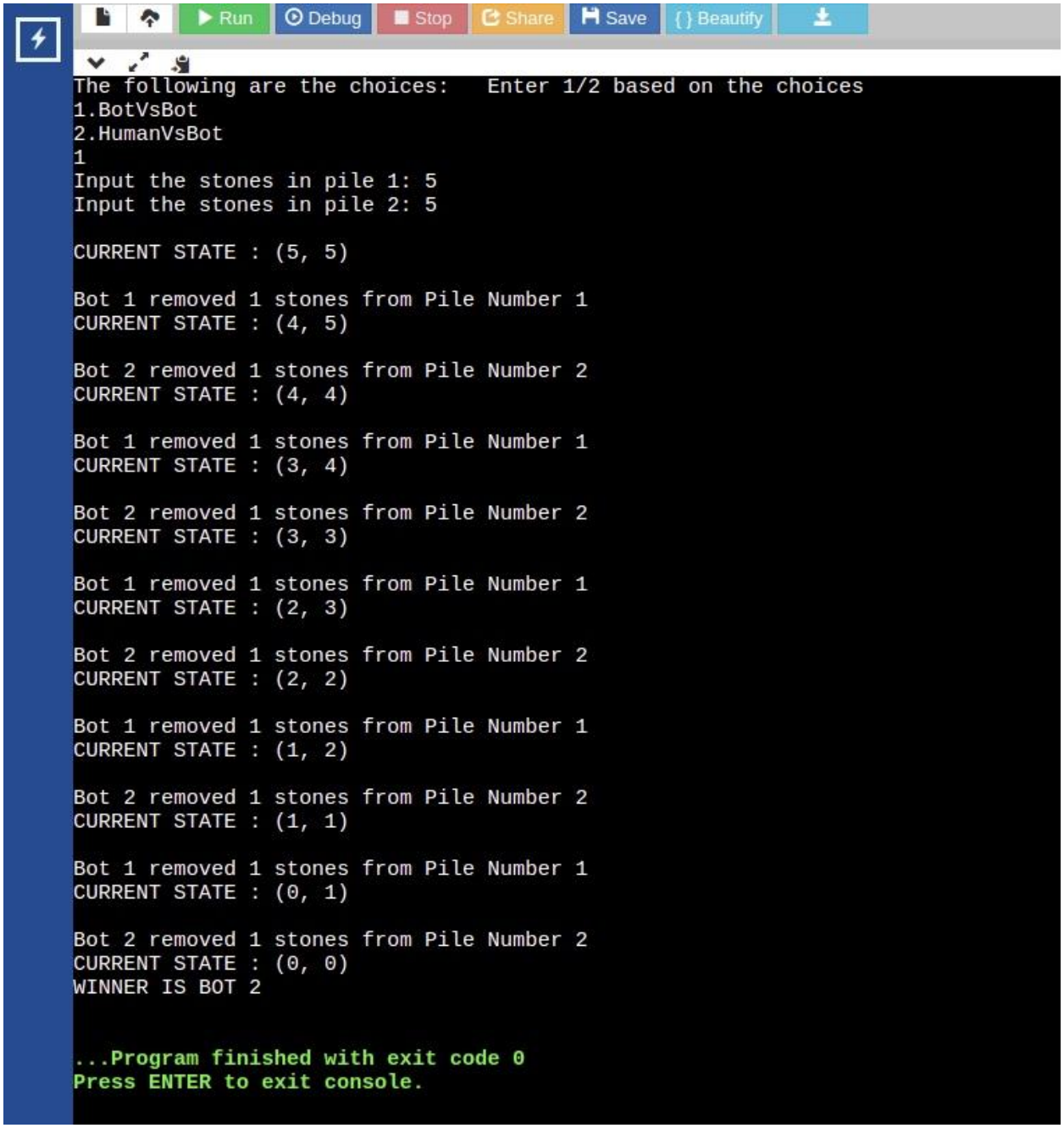
The above game was played between Human and Bot where Human plays the first move.

2. **<u>Bot Vs Human</u>**



The above game was played between Human and Bot where Bot plays the first move.

3. Bot Vs Bot



The agent uses a recursive minimax code to decide the most profitable move. A method is designed for the BOT Game which has been included in the source code. The game would end if the sum of the piles is 0. For every move, the current game state is displayed. In between Human and Bot, the option is given to humans if they wish to start the first move.