CS 404 – Assignment 3:

A game can be formally defined as a kind of search problem with the following elements:

- Initial State (S_0): It is a board consisting of $m \times m$ empty cells, where m is an even number.

- States: After each turn when the player of that turn selects a cell, they want to put the slant, displaying the current state. Additionally, each state has an attribute called $to_move, indicating which player's turn it is$.

- Players: There are a total of two players playing the game, where the first one is the person running the code (i.e., human), and the other is the computer itself that is utilizing the minmax alpha-beta pruning algorithm.

- Actions (s): It is a function returning the set of legal moves in a state that are empty cells.

- Result (s, a): It is a transition model defining the result of a move.

- Terminal-Test (s): Boolean function which is true when the game is over, and false otherwise. It basically checks the number of empty cells remaining.

- Utility Function (s, p) (Payoff Function): Defines the final numeric value for a game that ends in terminal state s for a player p.

There exist two types of input in this game:

- A matrix with the size of $(m+1) \times (m+1)$, defining the game board with the circled numeric values in it (will be taken once at the beginning of the game).

- Coordinates that the human player wants to put the slant (will be taken several times until the game ends).