Mancala Project

Submitted by

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The game description:

Mancala is a two player game, Where each player have seven buckets six of them have stones and the seventh is empty in the beginning of the game and that is your score bucket, The goal for each player is to move the stones to this score bucket and the player with more stones in his bucket wins.

In the beginning of the game each bucket have four stones in it and each player take a turn to move his stones, You move the stones by taking all the stones out of the bucket that you want to move from and then you pass through the buckets in the way to your score bucket and put one stone in each bucket you pass through and on stone in your score bucket and the rest goes to your opponent if finished the stones at your score bucket you play again.

There is too modes to play this game stealing and without stealing, Stealing means that when you move your stones and the last stone goes to an empty bucket you steal the stones that are in the opponent bucket that is in front of this bucket and all this stones goes to your score bucket, If one of the two players finished all their buckets the other player take what left in his buckets and put it in his score bucket and then each player count how many stones he have in his score bucket and the one with more stones wins.

The implementation:

We implemented the game that we have two player and they can be (human vs human) and (human vs AI), Also we can chose which player to start playing and chose the game mode is it stealing or not.

We have three pages in our game the first page is the main page where we can start the game with the default settings **(difficulty: medium, human vs AI, stealing, player one start)** or go to the settings page, in the settings page we can chose the difficulty of the AI **(easy or medium or hard)** and then chose **(human vs human or human vs AI)** and chose the game mode **(with stealing or without stealing)** and chose which player to start playing.

Then you save the settings and go back to the main page to start the game and go to the third page where you can start playing when it's a human turn you can click on the bucket to play as each one is a pushbutton.

The code details:

We implemented our game in five files

The Board.py file:

We created a mancala class to describe the mancala board and some functions

The class functions are:

The __init__ function:

We defined the board as a list of 14 elements.

The IsGameOver function:

We check if the buckets of each player is empty or not and if its empty then its game over and the stones left in the other player buckets are moved to his main bucket and if the game is not over we return false.

The Stones_Move function:

We make the move from the bucket that the player chose to move from and increase the number of the stones in the other buckets in the way and continue if it is the main bucket of the opponent and also check if the player will play again or not.

The Score function:

We check if the game is over or not first and if it is over we calculate the number of stones in each player main bucket and return the score.

The AlphaBeta.py file:

Created the AI algorithm using the Minimax algorithm with alpha-beta pruning.

It is a recursive function and its parameters is **(board, depth, alpha, beta, play_agin, stealing_flag)**

Board: is the mancala board from the mancala class

Depth: is a measure to go further in the searching tree

Alpha: the final value of the maximizer

Beta: the final value of the minimizer

Play_gain: a flag to check if the last move is in the score bucket or not

Stealing_flag: to determine the movement mode with stealing or not

The start.py file:

It is the main file and contains all the other files.

It contains two important functions:

GameWidget_Setup: setup the game window.

SettingsWidget_Setup: setup the settings window.

The settings.py file:

It contains the save function which takes the values of radio buttons and returns four status variables **(mode: specify the depth of the AlphaBeta**

algorithm, player two status: human or AI, first player status: which player to start, stealing status: with stealing or without stealing)

The Game.py file:

The __init__ function: set the default settings **(difficulty: medium, human vs AI, stealing, player one start)**.

We have 12 pushbuttons each one have a function that describes the move **(Make_Move)**

Game_Play function: handles the game process and the turns between the players

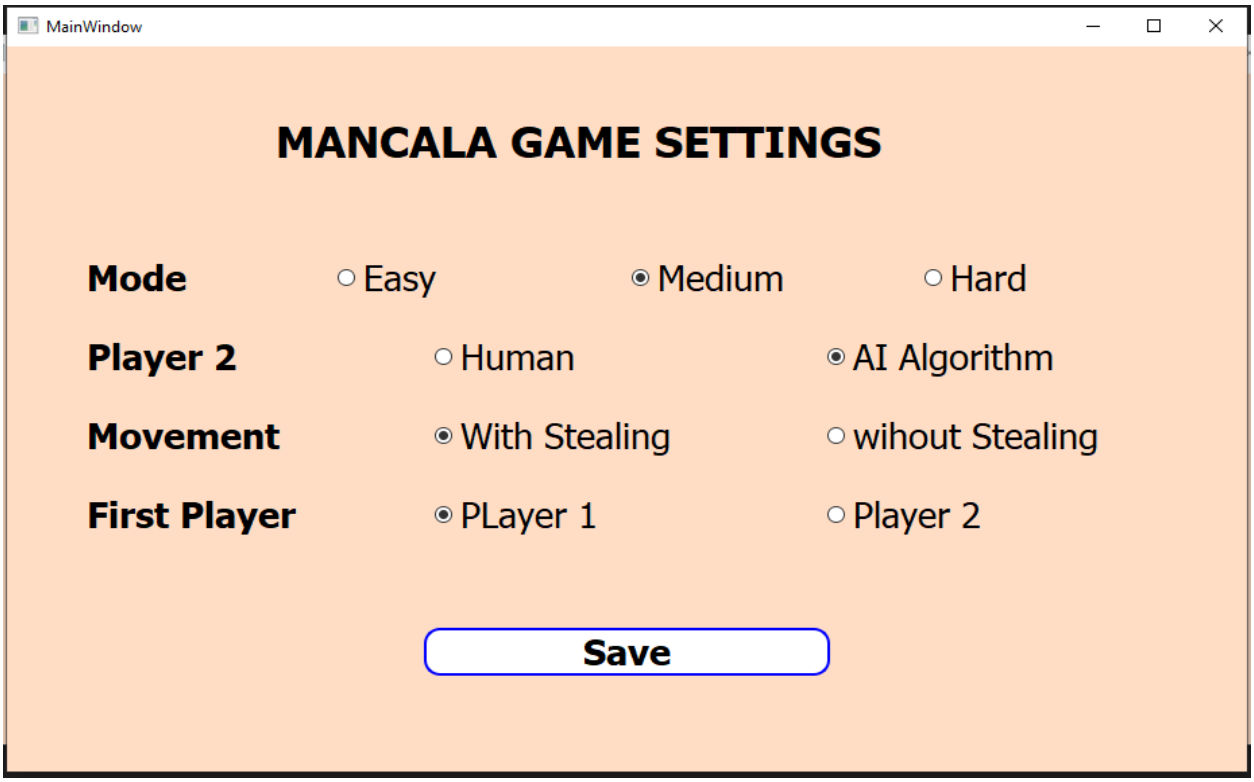
Update_Mancala function: set the values of mancala board list into pushbuttons and line edits.

Update_Settings function: update the four settings flags which came from the save function from the settings class.

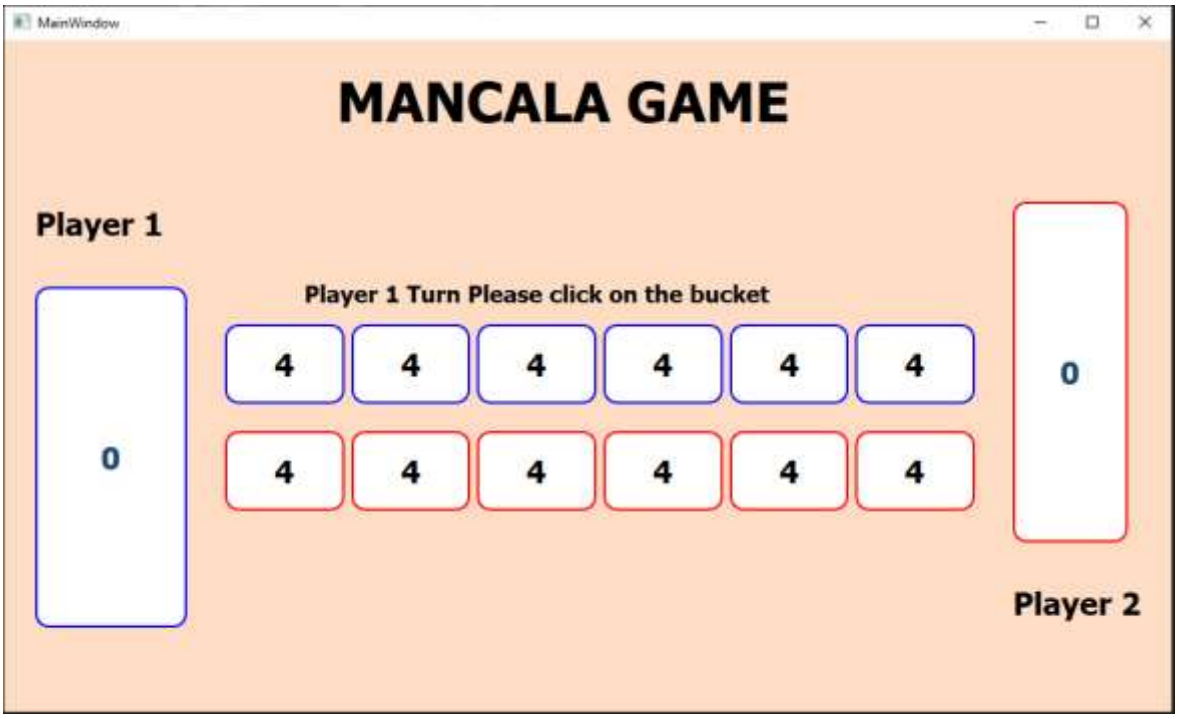
The snapshots:

The main window

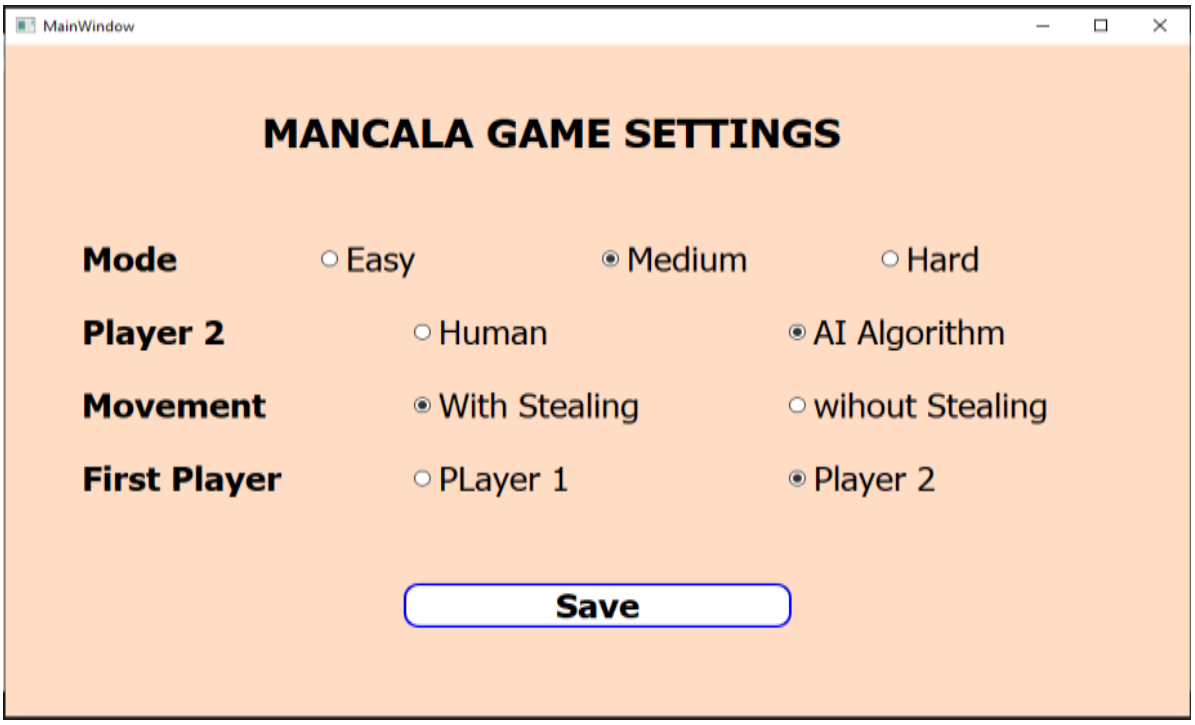
The default settings



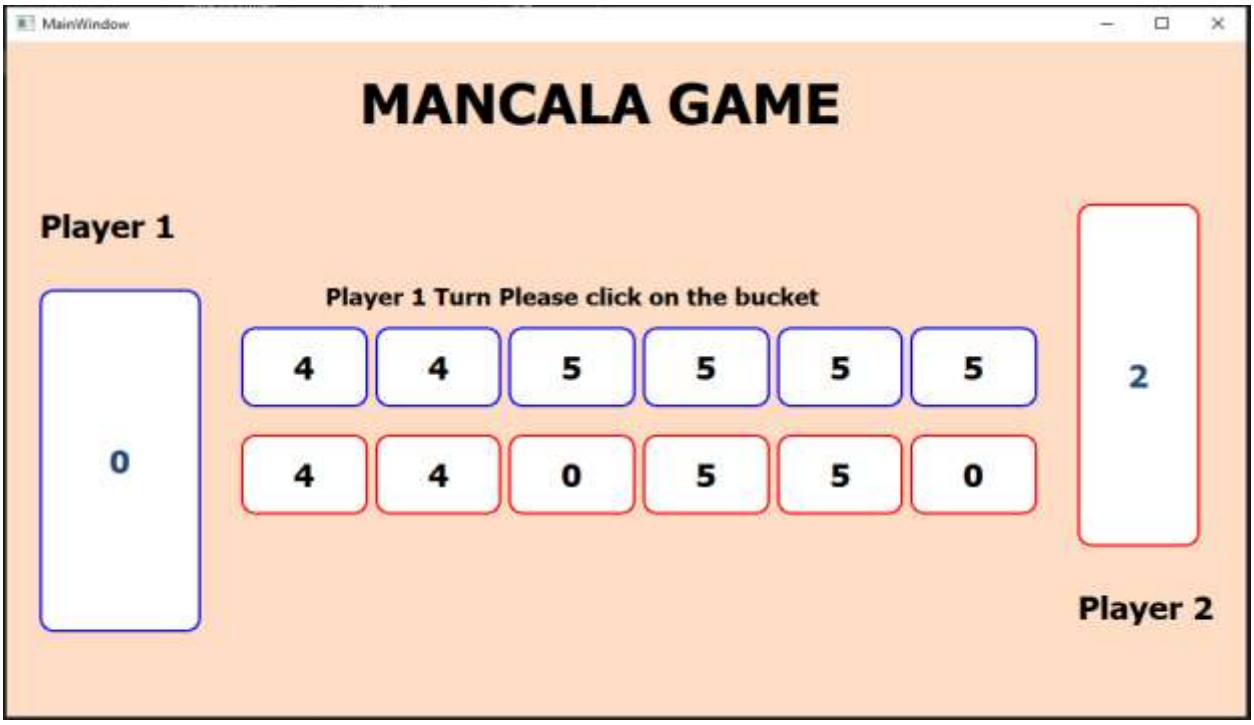
Playing with the default settings human vs AI human start



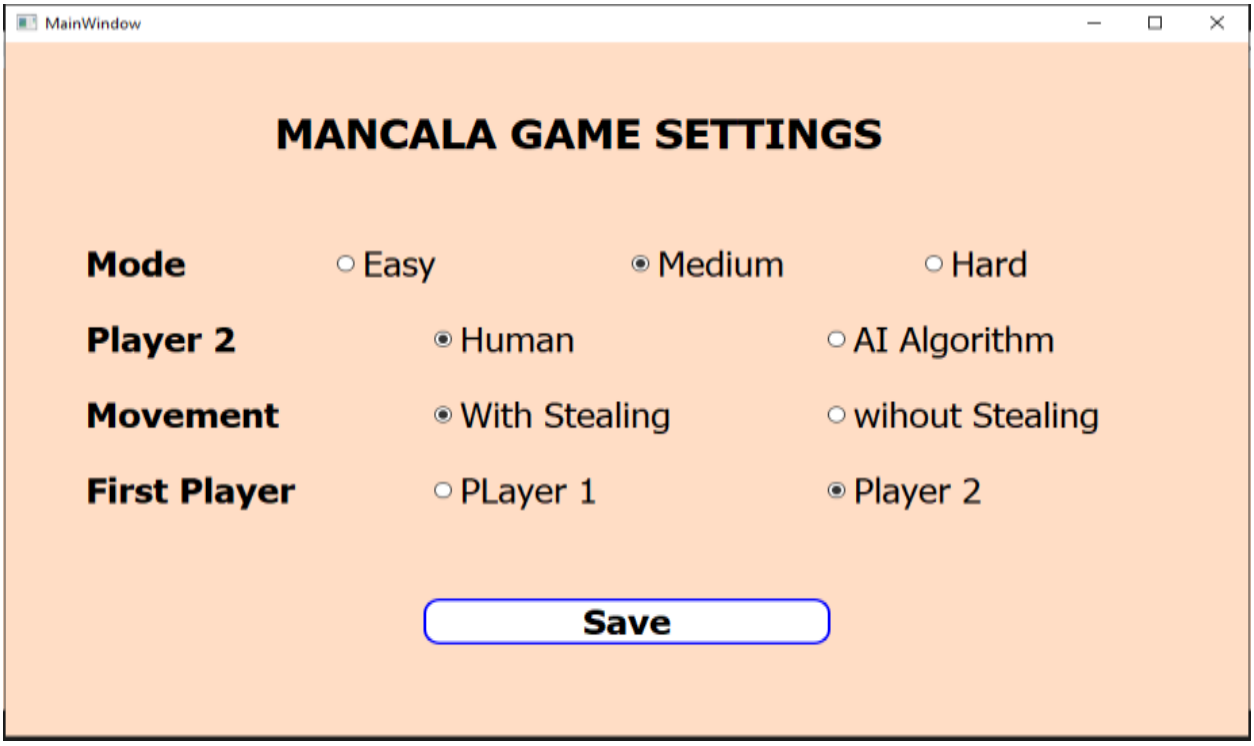
The settings page human vs AI and AI start playing



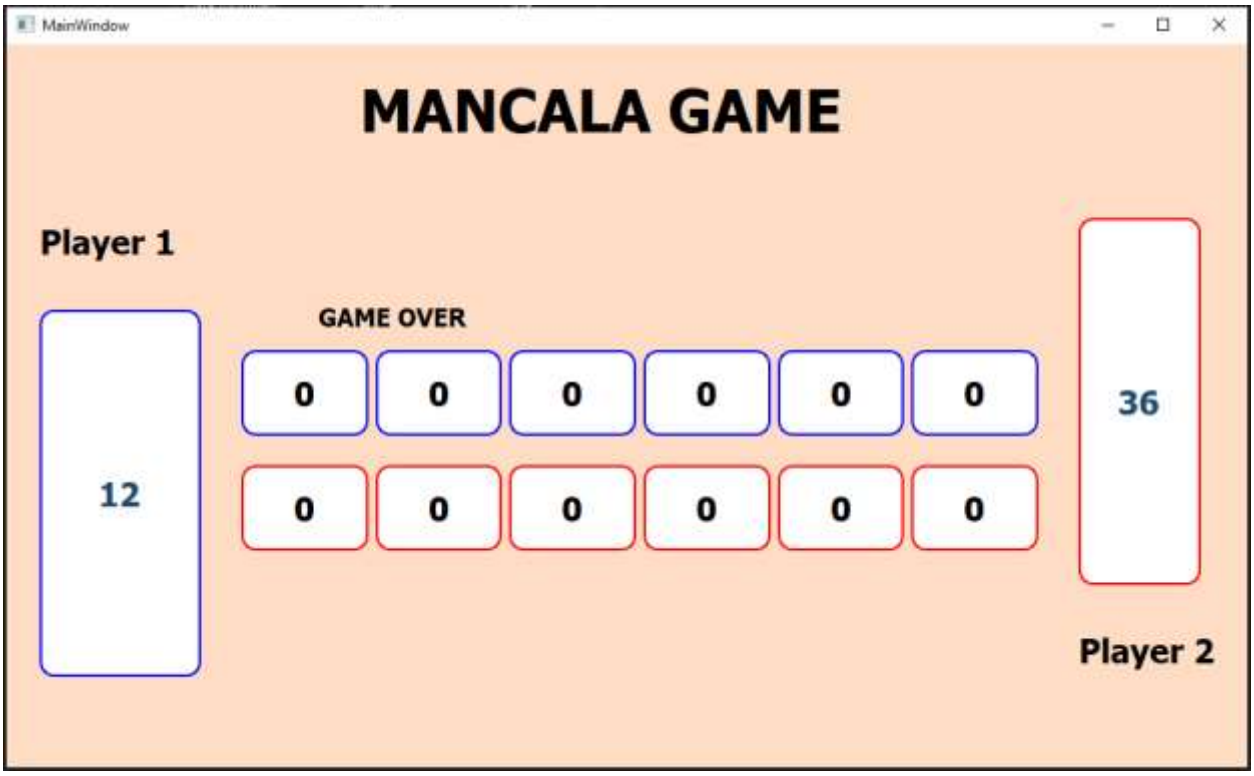
The AI starts first



The settings page human vs human player two start



The game is over player two wins



The team participation:

Name	Participation
Ahmed Mostafa Abdelfattah	- Writing the report - Designed the UI - Participated the game.py - Made the youtube video
Abdullah Ahmed Mohamed	- Writing the report - Made the board.py - Wrote the Readme file
Abdelaziz Hosny Abdelaziz	- Writing the report - Made the AlphaBeta.py
Amr Mohamed Ezaat	- Writing the report - Designed the UI - Made the settings.py - Participated the game.py
Abdelrahman Mohamed Ahmed	- Writing the report - Made start.py - Participated in the game.py