Sudoku Solver

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Introduction

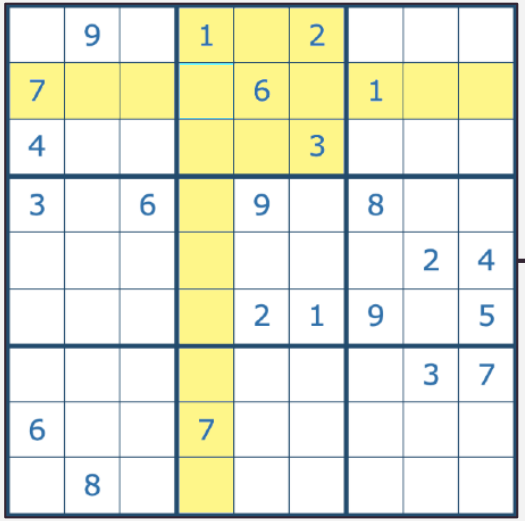
- What is AI ?

- AI traditionally refers to an artificial creation of human-like intelligence that can learn, reason, plan, perceive, or process natural language.
- AI is a rapidly advancing technology, made possible by the Internet, that may soon have significant impacts on our everyday lives

- Games and AI

- Game AI is mostly focused on which actions an entity should take, based on the current conditions.
- In each case it is a thing that needs to observe its surroundings, make decisions based on that, and act upon them.

Problem definition



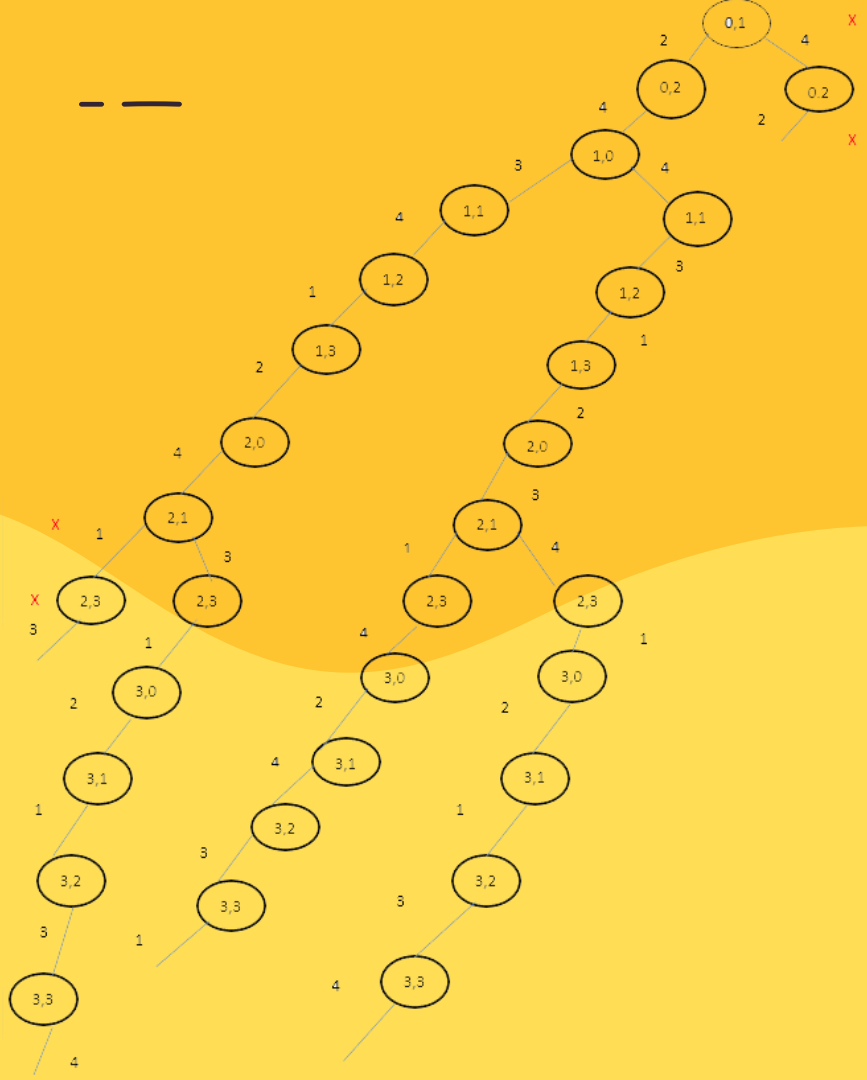
	9		1		2			
7				6		1		
4					3			
3		6		9		8		
							2	4
				2	1	9		5
							3	7
6			7					
	8							

Putting the right number in the right place is a problem in Sudoku that you need to think about so that the same number doesn't repeat in the column, row and box.

Solve problem

Algorithm used : “Backtracking”
Backtracking search is an exhaustive search algorithm (depth-first search). It checks the row, column, and box and sees if the number is appropriate for this place. This process is repeated until the appropriate number is found.

Game tree



1			3
		2	

1	2	4	3
4	3	1	2
3	1	2	4
2	4	3	1

Code solution

1

Constructor to initialize class variables after getting information from the user

```
public Sudoku(int[][] board,int n)
```

2

we check if a possible number is already in a row

```
private boolean isInRow(int row, int number)
```

3

we check if a possible number is already in a column

```
private boolean isInCol(int col, int number)
```

4

we check if a possible number is in its inner box

```
private boolean isInBox(int row, int col, int number)
```

5

combined method to check if a number possible to a row,col position is ok

```
private boolean isOk(int row, int col, int number)
```

6

We will use a recursive Backtracking algorithm

```
public boolean solve()
```

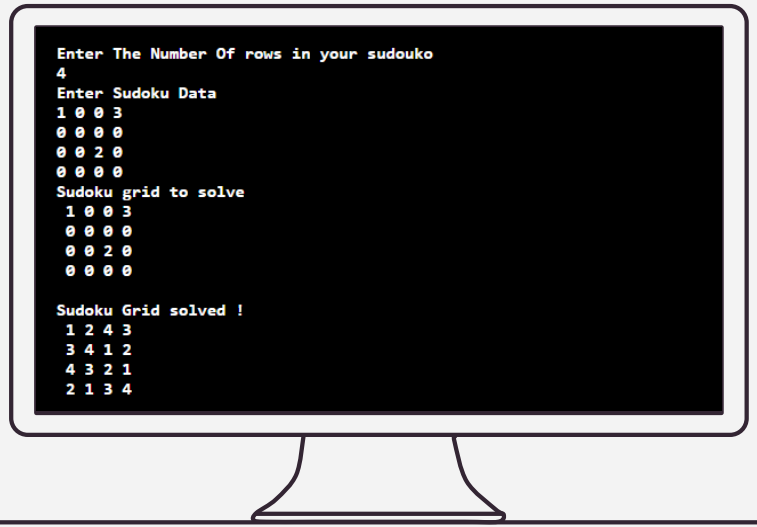
7

Display the board to the user

```
public void display()
```

Run code

The player consider 4x4 sudoku as following:



Conclusion

Sudoku is a strategy-based game to complete and fill with numbers the right way. In this project, we have provided a solution to the Sudoku problem. By following a backtracking strategy we avoid repeating the same number in a column, row, and box. Although we had trouble finding a solution, the backtracking strategy solved it. Backtracking checks the row, column, and box and sees if the number is appropriate for this place. This process is repeated until the appropriate number is found.

THANKS!

Does anyone have any questions?

Rreferences

References:

1. Sizer,B. The Total Beginner's Guide to Game AI. Gamedev. August 13, 2018. Availabe at: https://www.gamedev.net/articles/programming/artificial-intelligence/the-total-beginners-guide-to-game-ai-r4942/

2. Erickson,J. *Algorithms* (1st ed.). June 13, 2019

3. Saurel,S. Build a Sudoku Solver in Java.medium. June 2,2018 .Availabe at: https://medium.com/javarevisited/build-a-sudoku-solver-in-java-part-1-c308bd511481

4. Wikipedia contributors. Sudoku. Wikipedia, The Free Encyclopedia.November 24,19.Availabe at: https://en.wikipedia.org/wiki/Sudoku