NOUGHTS AND CROSSES

AN APPLICATION OF MONTE CARLO SIMULATION

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Agenda

01 About the Game

02 Variations in our game

03 Applying Monte Carlo Simulation

04 Results

About The Game

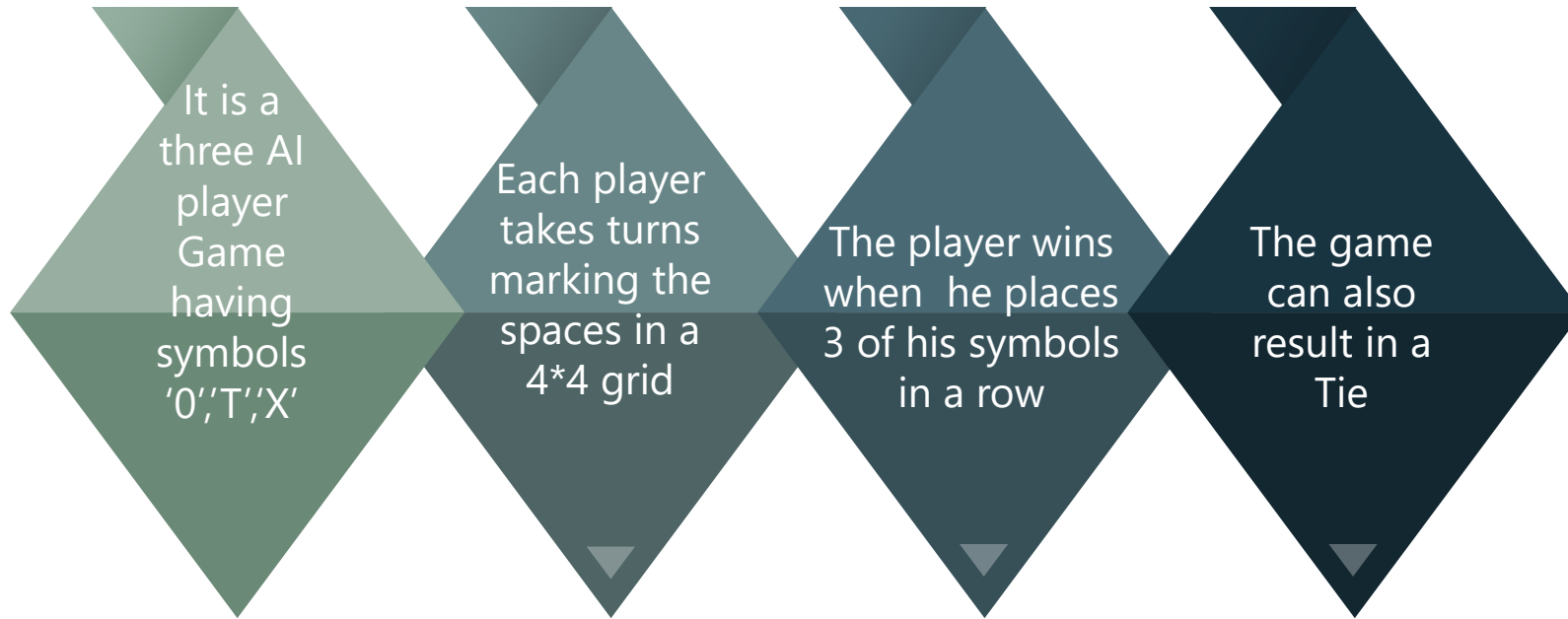It is a two player Game having symbols '0' and 'X'

Each player takes turns marking the spaces in a 3*3 grid

The player wins when he places 3 of his symbols in a row

The game can also result in a Tie

7	8	9
4	5	6
1	2	3

Variations In Our Game (4*4)

It is a three AI player Game having symbols '0';'T';'X'

Each player takes turns marking the spaces in a 4*4 grid

The player wins when he places 3 of his symbols in a row

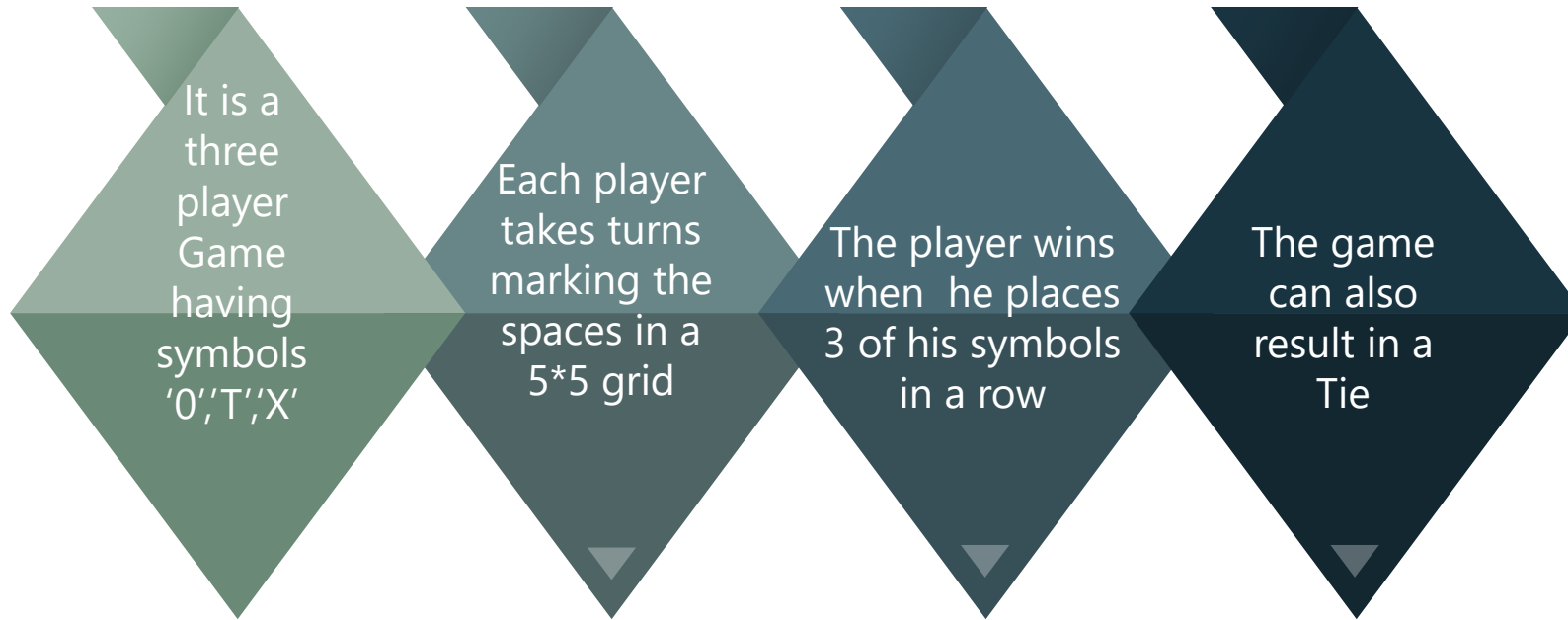The game can also result in a Tie

13	14	15	16
9	10	11	12
5	6	7	8
1	2	3	4

Variations In Our Game (5*5)

It is a three player Game having symbols '0';'T';'X'

Each player takes turns marking the spaces in a 5*5 grid

The player wins when he places 3 of his symbols in a row

The game can also result in a Tie

21	22	23	24	25
16	17	18	19	20
11	12	13	14	15
6	7	8	9	10
1	2	3	4	5

AI Algorithm In Our Game
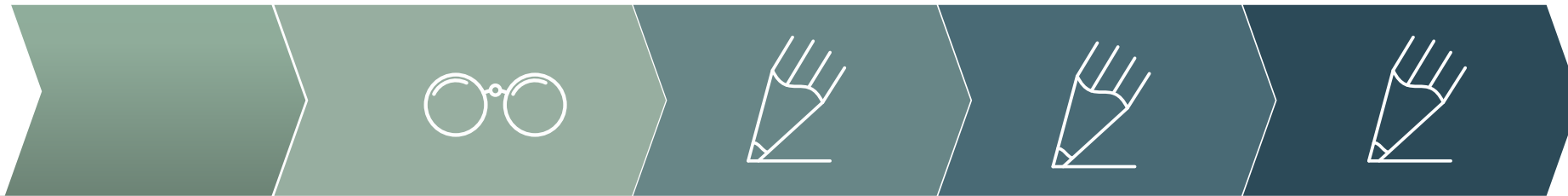
2 AI will smartly play and the 3rd one will be a dumb one.

Smart AI's will look for the available positions.

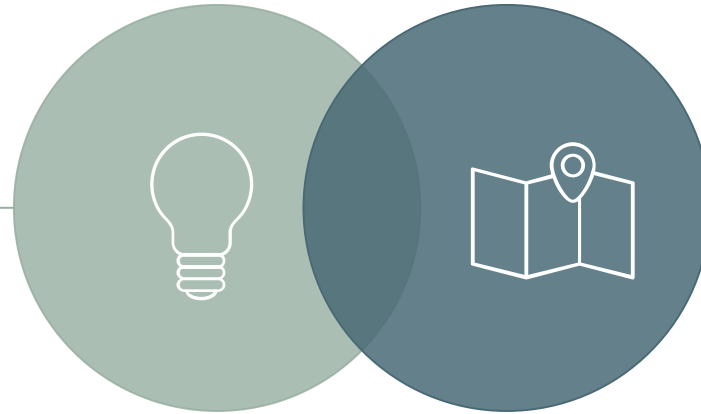Smart AI's will either look for their own winning positions first.

Or they will look for the competitors winning positions and block them.

Else AI will place its symbol in the remaining other places, whereas the dumb one will place its symbol anywhere in the grid.

About Monte Carlo

A class of algorithms that rely on repeated random sampling to compute their results.
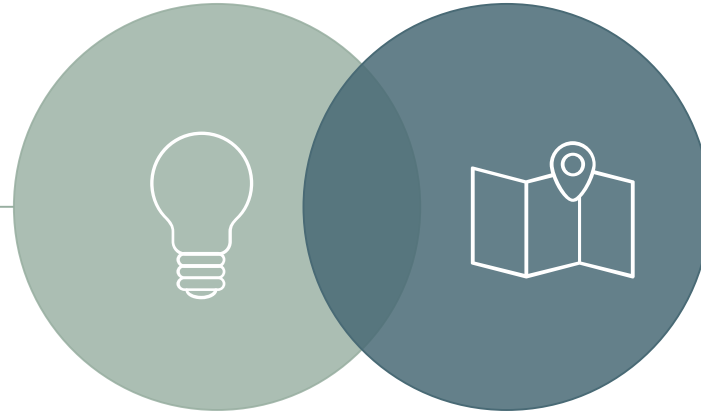
We have done simulations because from a single game it becomes difficult for determining the exact results. We used Monte Carlo Algorithm in our project to determine the winning probabilities of each AI

Random variables

Sequence_of_players()
– This variable randomly selects the sequence/order in which AI's play their turn.

Select_symbol_sequence()
–This variable randomly assign a symbol to each AI player.

Assumptions and Game rules

- Each player and AI are aware of the game rules.

- A player can use the same strategy as the AI algorithm.

- There can be only one winner(if any) at the end of the game.

- There will be no simultaneous moves.

Hypothesis

- **The winning probability is independent of the order in which the players go.**

- **The winning probability is independent of the symbols with which the players play the game.**

Code Execution
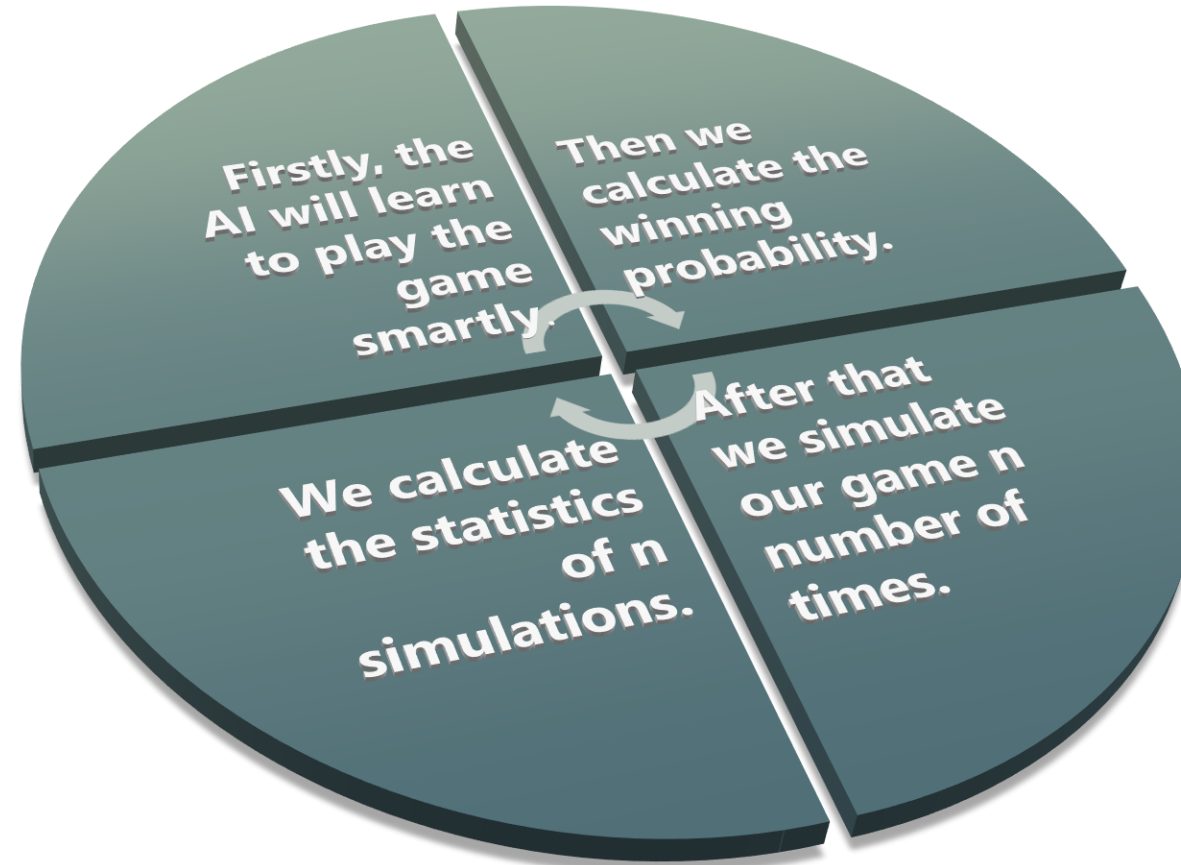
THANK YOU!

QUESTIONS/SUGGESTIONS?