Introduction to AI

Project : $N \times M \times K$ Tic Tac Toe

Not 3D

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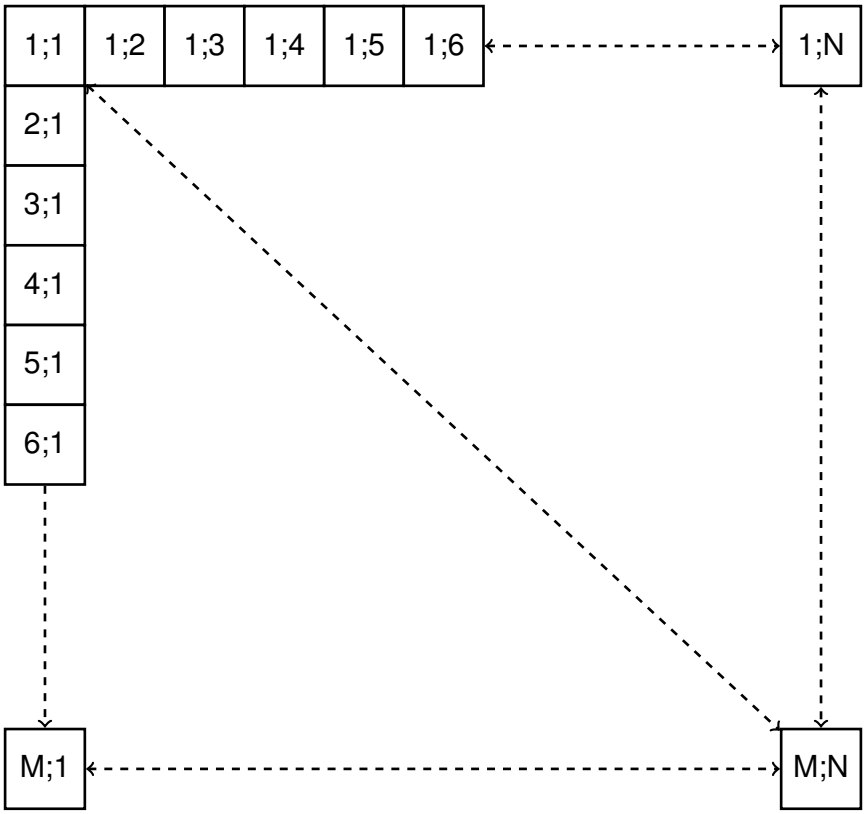
1 PRATICAL INFORMATIONS

- Individual project ;
- Deadline : 30th of November ;
- Deliverable 1 : A python file with a class named "Solver" which can be initialised with *Solver(X,k)* and with the following method : *solve*(*M*), where *M* is a NumPy matrix of integers, *X* your symbol (either 1 or 2), which return a tuple (A,B) with A and B strictly positive natural numbers ;
  - ⚠If your tuple violates the game constraints, you simply miss the turn ;
  - ⚠Execution time of *solve*(*M*) is limited !
- Deliverable 2 : A report of max 3 pages which describes your work. Appendix with some statistics are more than welcome;
- Upload your deliverables (pattern : *name*_tictactoe.{ pdf|py }) at the Montefiore submission platform

2 $N \times M$ TIC TAC TOE GRID



This is a classical tic tac toe grid. You'll notice that the grid can be really large. Plus, it is not necessarily a square.
Usually, we denote 'X' and 'O' for each player token, but in this project we'll go for 1 and 2 (0 is empty).

The rules[1] remain the same, except the following. Instead to have most complete diagonals/lines/columns with the same symbol, players have to build, with their symbol, diagonals/lines/columns of size K (denoted as K-alignment) with the same symbol. Plus, they can use the fact that two alignments can share (at most) one symbol.

Thus, the goal is to have more points than the opponent at the point where it is not possible for any of the players to build more K-alignments. The game is made more challenging with a budget time limit of 1 minute.

Below are some common scoring examples with a 10×10 grid and $K = 5$.

[1] For a quick reminder : https://en.wikipedia.org/wiki/Tic-tac-toe

				X					
				X					
				X					
				X					
				X					
			X						
		X							
	X								
X					X	X	X	X	X

Figure 2.1: Here, the score for the player *X* is 3

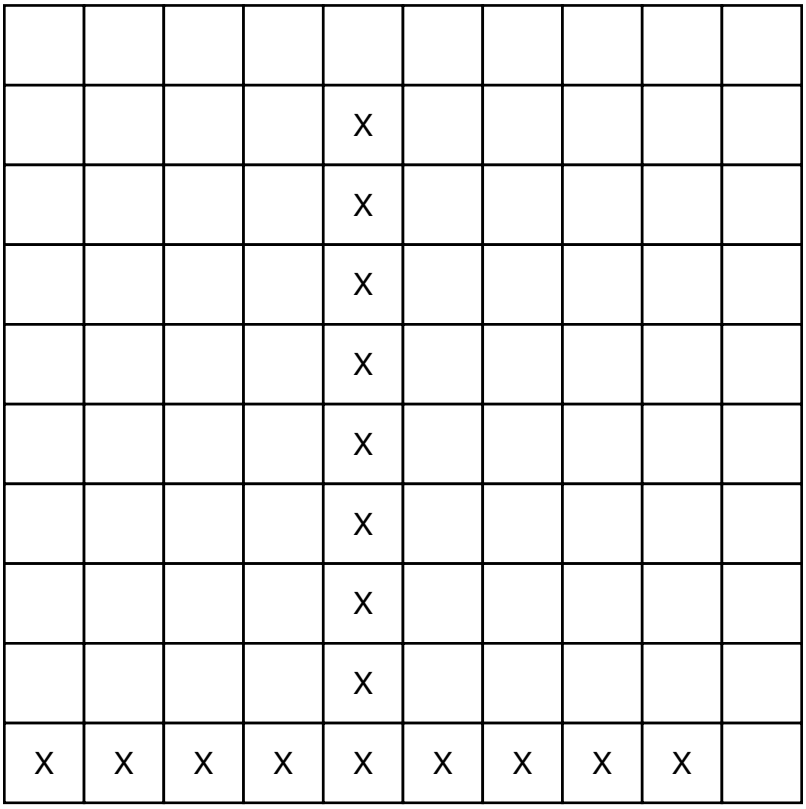


Figure 2.2: Here, the score for the player *X* is 4