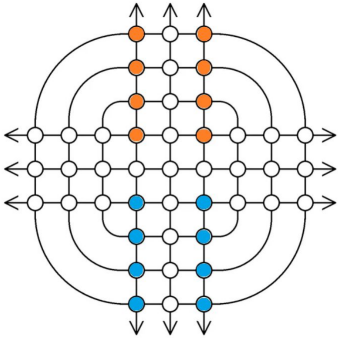
U.PORTO
FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

Wana

Artificial Intelligence
L.EIC 2022/2023

Group 15
Alexandre Costa - up 202005319
Ana Beatriz Fontão - up202003574
Ana Rita Oliveira - up202004155

Project Specification



Our goal for this project is to implement a two-player board game called Wana with different player modes with ai. In order to implement these versions, we will use implement algorithms based on the ones covered in the lectures.

The board for this game is shaped like a cross and each player has 8 pieces. In their turn, a player has to move a single piece as far as they want along a line. When moving a piece, they can't move through other pieces but are allowed to travel off the board and appear from the other side.

The game ends when a player can't move a piece.

Formulation of the problem as a search problem

- **State Representation**:
  - List of Piece objects, where each Piece has a row, column and a player it belongs to, [Piece(col, row, player)].
- **Initial State**:
  - List of Pieces (8 Pieces per player), 4 in each column adjacent to the middle column (on every row but the middle one)
- **Objective Test**:
  - List of Pieces, such that at least a Piece doesn't have a single valid move
- **Operators**:
  - move
    - Pre-conditions:
      - There isn't another Piece in the way of the wanted position
      - The wanted position is empty
      - The Piece belongs the Player whose turn it is
    - Effects:
      - The current position of the Piece becomes empty
      - The Piece occupies the wanted position by changing the row and col values

Implementation

- We're using Python to implement the structure and Pygames to display the game
- Currently, the whole game is implemented for the human vs human mode
- To represent a single piece we created a class 'Piece' that contains its position and player
- The board is also a class ('Board') that contains a list of pieces and their respective positions
- In order to define the correct circular paths, when we are initializing the board we create a list of list that contains all the positions in these paths in the right order
- We created a function that, given a position, returns a list with all the valid moves for that piece
- A player loses when they have a piece that has zero valid moves.

Work References

- https://boardgamegeek.com/boardgame/364012/wana
- https://www.pygame.org/docs/