MAIS 202 Deliverable 1 - Project proposal
2048 Game Solver

Project Idea

For our project, we will design and train an AI model to play and solve the popular game '2048'. The game in question is a single player puzzle-game that requires the player to move and merge blocks/tiles with the same value to create tiles of large values. Usually the objective is to combine these tiles (powers of 2) until you can reach the 2048 (2^11) tile!

The game is quite simple but finding the optimal sequence of moves is non-trivial. It will require some reinforcement learning to teach the model which moves to make.

Choice of dataset

No dataset will be used as there are too many board configurations and randomness is involved in every step of the game. The model will then learn from its past mistakes games (reinforcement learning).

Methodology

a. Data Preprocessing

The model will examine the board state after every move. Each board state can be represented as a 4x4 array (= 16 tiles).

b. Machine learning model

The model will have to choose between 4 moves (up, down, right, left) at each iteration until the end of the game (it has no legal moves left).

c. Model Evaluation

The performance of the model will be evaluated according to its score. The score is calculated by the sum of values of all merged blocks across the game (ie. merging two tiles valued at 8 each will add 16 to the score).

We could also encourage the model to follow certain winning strategies (such as keeping the blocks in one corner and in decreasing order from that corner) to increase performance.

Application

We will build a simple web interface which replicates the exact game conditions and where the users can watch the model play the game.

Input

The user will be able to start the game with a start button.

For comparison with the model, we could also invite the user to play the game.

Output

As the game is started, the user will see the decision making of the model, as well as the score obtained at every state of the game.

Alternate Project Idea instead: connect-4 where users play against the model?