



IMT Atlantique

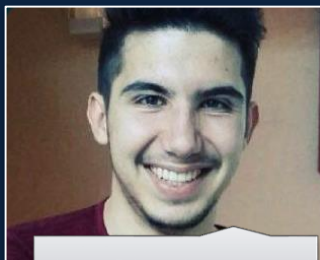
Bretagne-Pays de la Loire

École Mines-Télécom

AI CHALLENGE



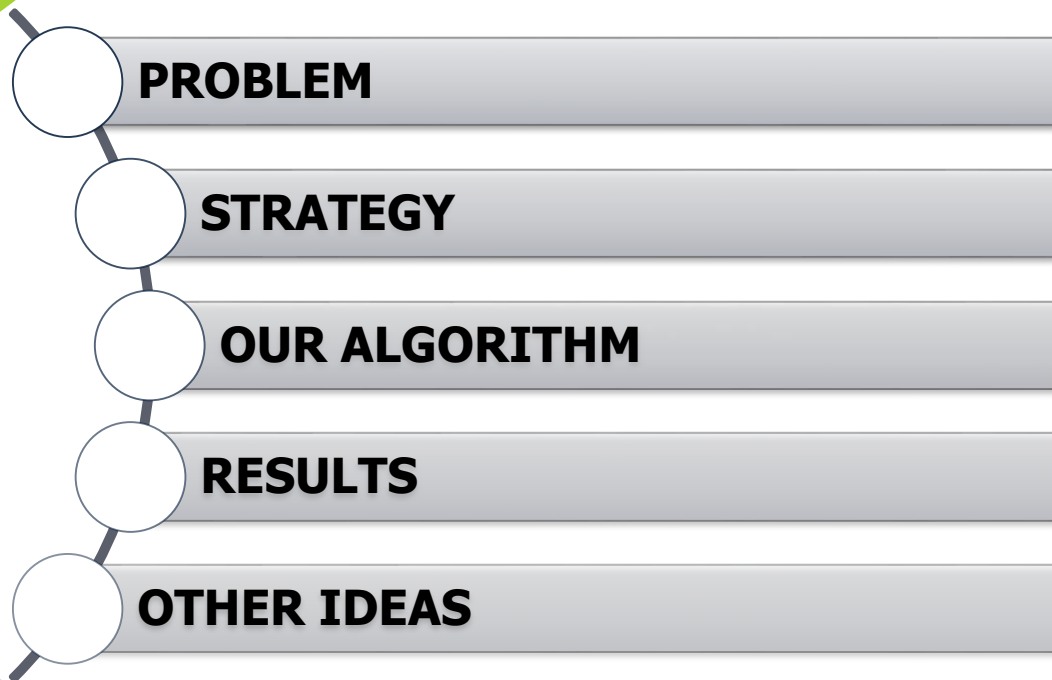
Venceslas KOUASSI



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PLAN

2

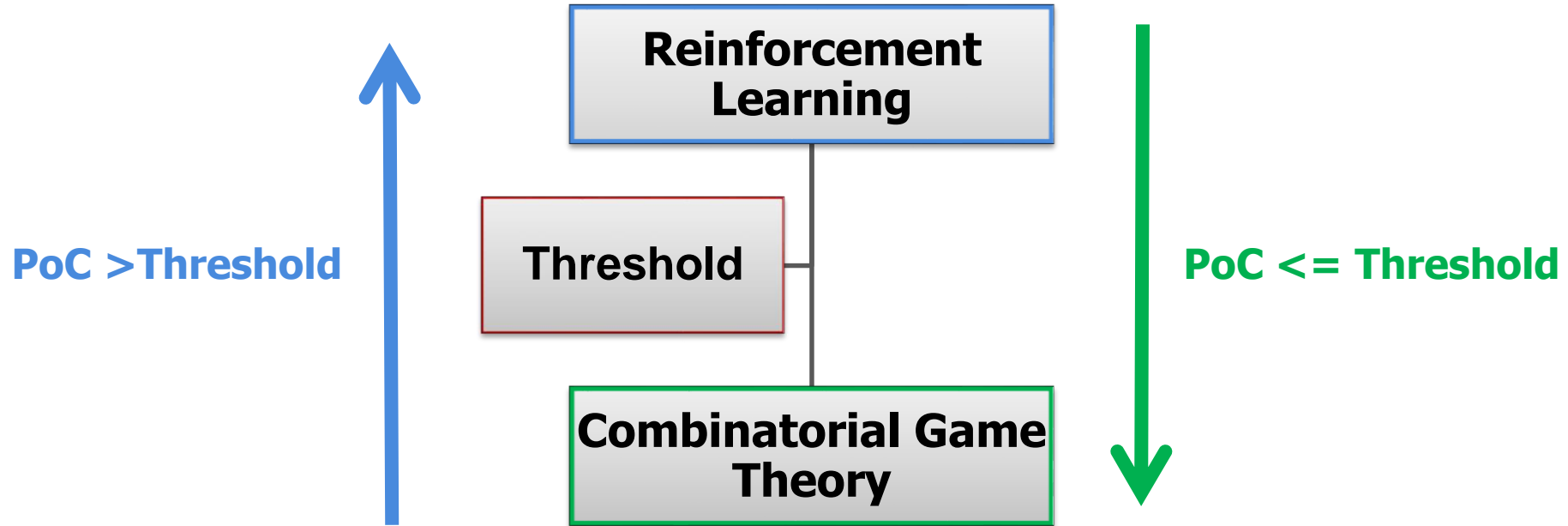


- **Design an AI algorithmic approach that wins PyRat games against a greedy algorithm (always targeting the closest piece of cheese)**



Parameters :

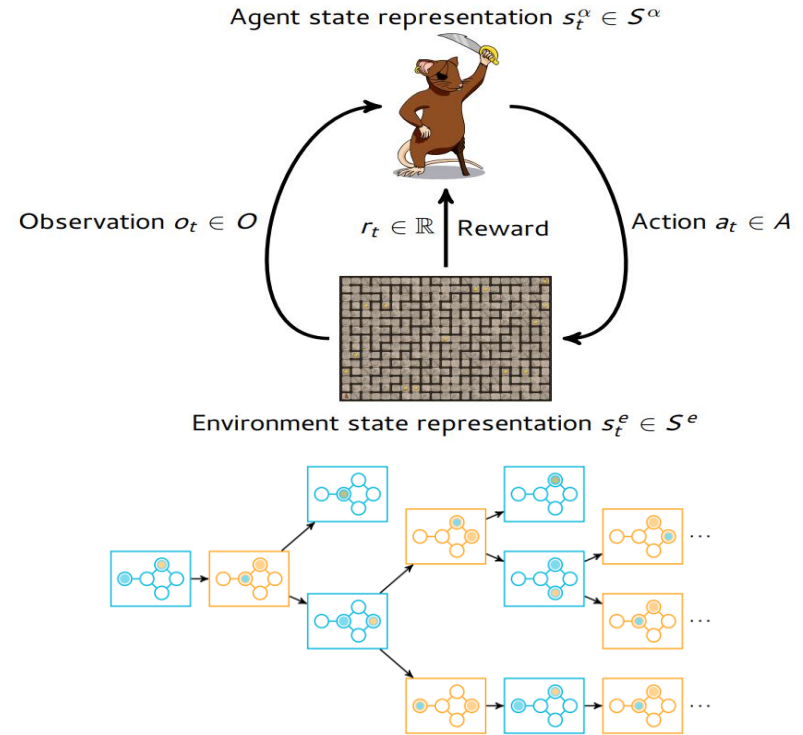
- ☐ **No walls**
- ☐ **No mud**
- ☐ **Size 21x15**
- ☐ **40 pieces of cheese**
- ☐ **Non symmetric maze**
- ☐ **1000 tests in less than an hour**



OUR ALGORITHM

5

1. **Reinforcement learning** : we just change the number of epochs (6000 -> 8000).
2. **Combinatorial Game Theory**: recursive function that goes through the trees of possible plays & takes as arguments a given situation, and return a best target piece of cheese. (very efficient)

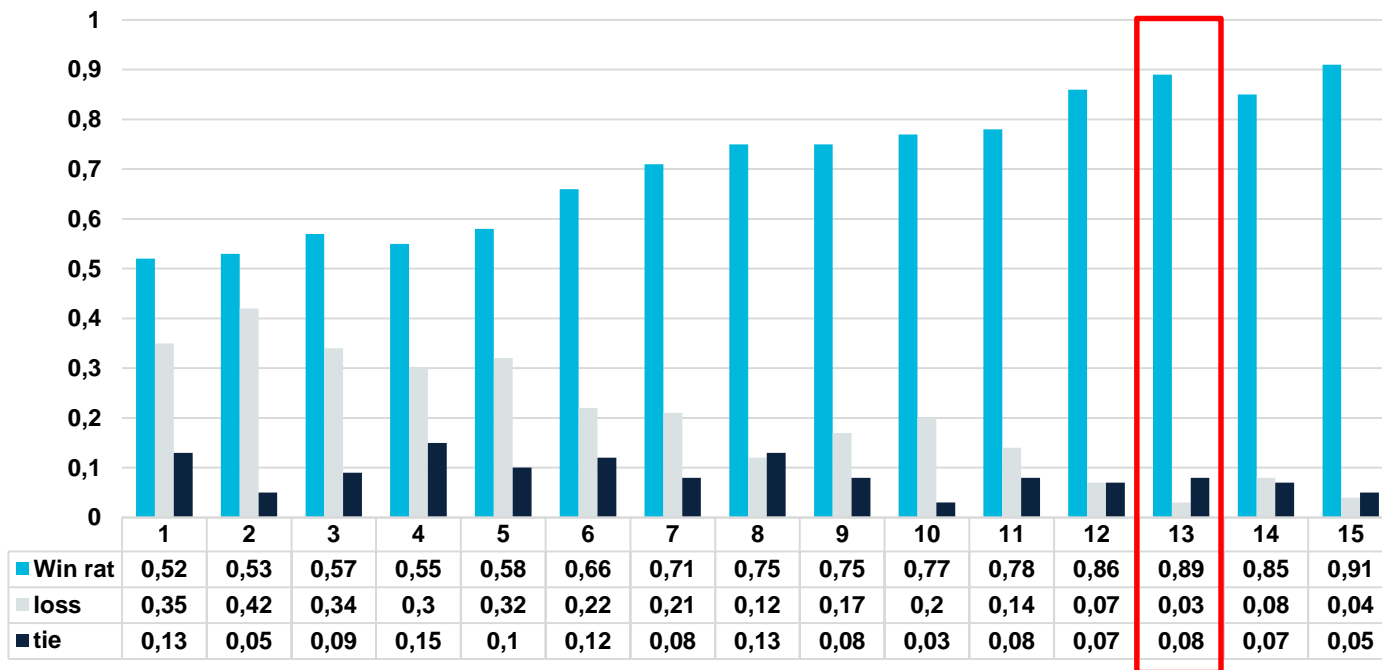


RESULTS (1/2)

6

- We ran 100 tests for each threshold :

Influence of Threshold on the Results



- So we can see that the higher the threshold is, the best score we get.
- However, beyond 13, the time to run the algorithm is too long.
- **Thus, we've chosen a threshold of 13.**

- **Cut the maze into 4 parts (or 16), and select the closest part. Then, apply an effective algorithm (like Combinatorial Game Theory) in each part.**

- **In the reinforcement learning, add some parameters for the learning, for example :**
 - random movements with a probability function
 - change the representation of the space
 - add the opponent's position

*Thank
you*