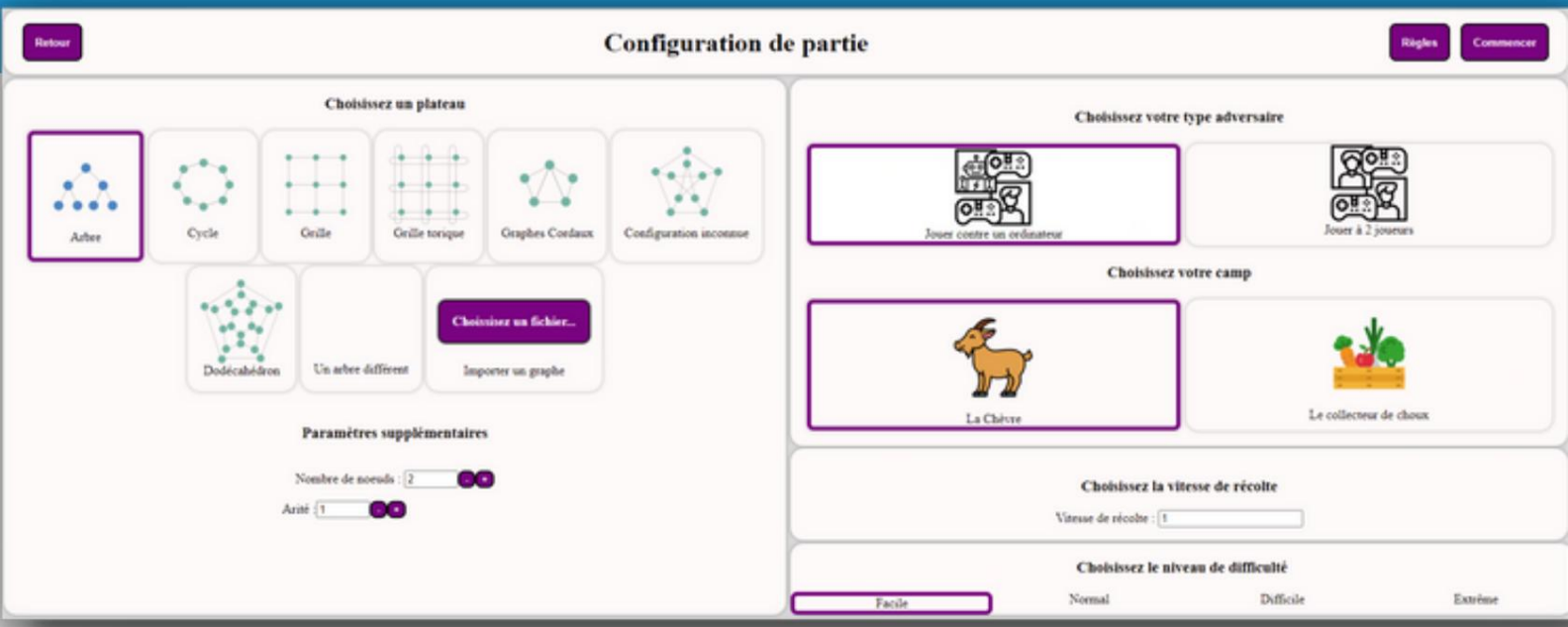
Les Stratégies de l'IA

Mode Jeu Libre



TERRA NUMERICA

THE GAME

SURFER

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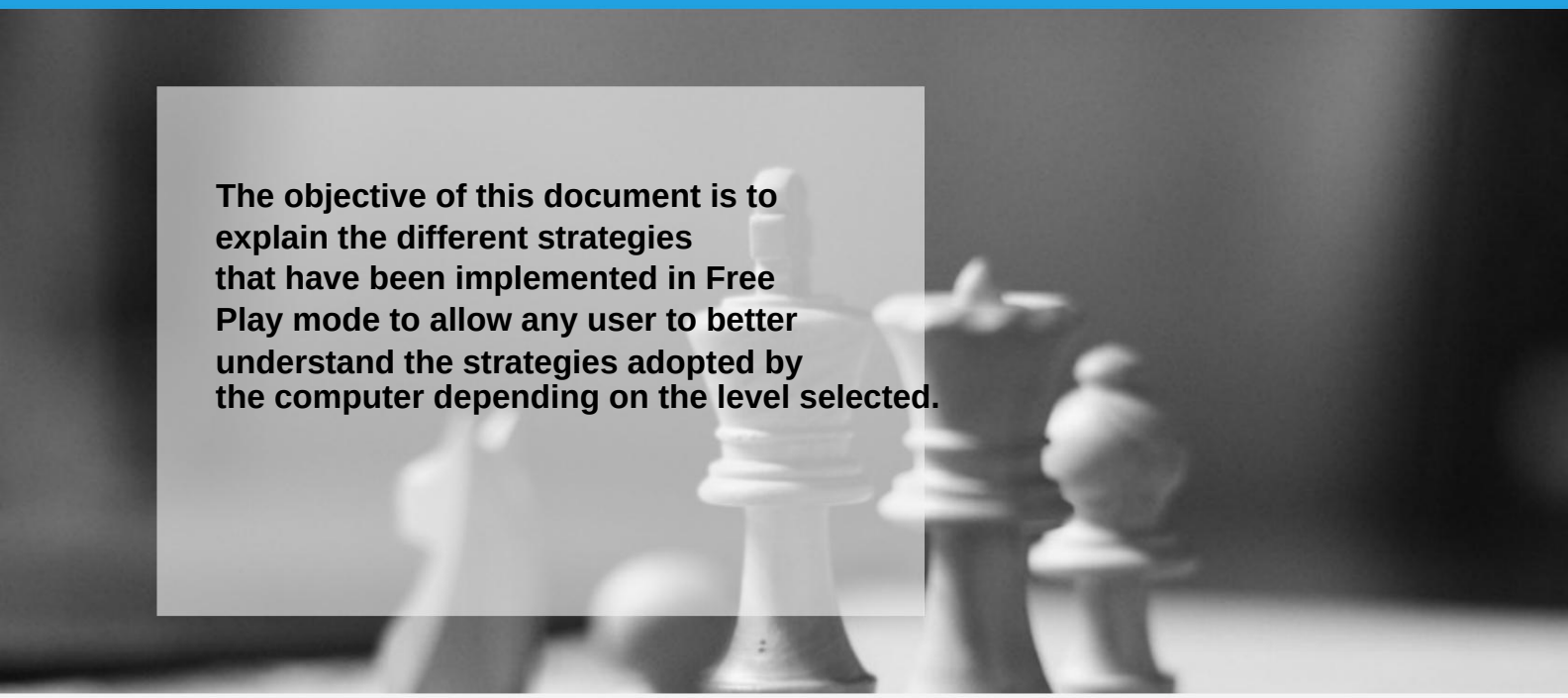
Motivations



The objective of this document is to explain the different strategies that have been implemented in Free Play mode to allow any user to better understand the strategies adopted by the computer depending on the level selected.

In this Protocol, we will explain each strategy implemented according to the types of players and the difficulty of the level.

The first part will be devoted to the presentation of the goat's strategies.

The second part will explain the strategies of the cabbage collector.

Stratégies de la Chèvre

Two Strategies are implemented for the Goat:

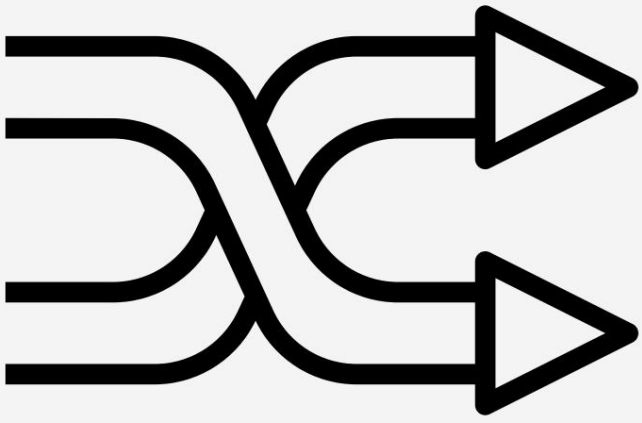
- A **naive** strategy : Naive-goat (Easy Level)
- A **gluttonous** strategy : Glutton-goat (Normal, Hard, Extreme Level)

These two strategies can be summarized as follows.

1 - Naive-goat

This strategy is the most intuitive there is and tends to model the reality of the problem. When a web browser user surfs the Internet, we do not necessarily always know how to predict their actions.

For example, he may search for information on a given site, search a few pages on this website, then return to the web link results in his browser because the site he has just consulted does not correspond to his search.



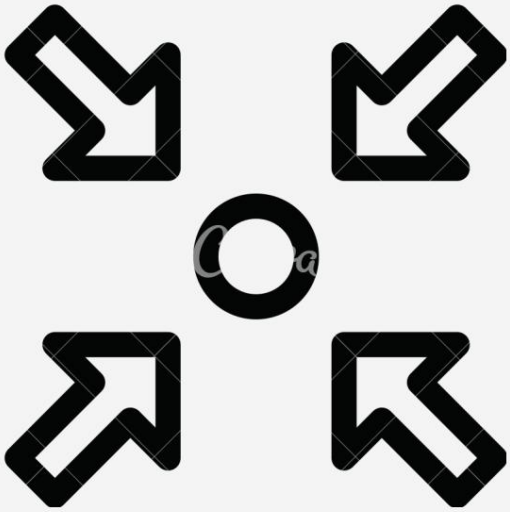
In fact, a random walk models this observation well. The first strategy therefore randomly selects a vertex among the neighbors of the node occupied by the goat.

Stratégies de la Chèvre

2 - Glutton-goat

This second strategy is also quite intuitive but rather aims to perform in the game. It would then model the "worst case" of internet search, where a user would take a path that would require the browser to make an effort to load pages optimally.

In this strategy, the goat adopts a connected path (no backtracking), and heads towards **the highest degree vertex** contained in the graph. The method that implements this strategy brings out the neighboring vertex contained in the shortest path to the highest degree vertex. In case of equality on the vertices, the method chooses the shortest path between those leading to vertices of equal degree.



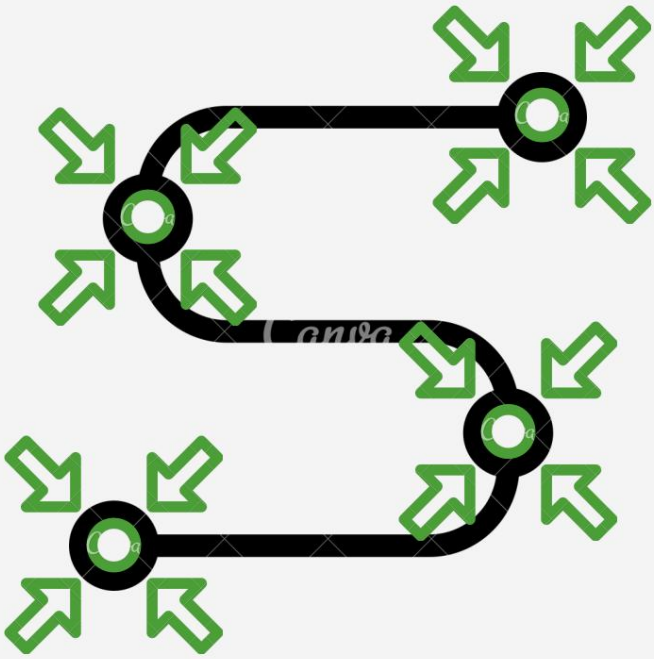
In fact, this strategy would allow the goat to move towards areas of the graph where it could access as many cabbages as possible, and therefore potentially win.

Stratégies de la Chèvre

3 - Max-path-goat

This last strategy seems to be the most optimal and once again aims to perform in the game. It would model the "worst case" of internet search in the same way as the previous strategy.

In this strategy, the goat adopts a connected path (no backtracking), and heads towards **the highest degree paths** contained in the graph. The method which implements this strategy brings out the neighboring vertex contained in the path which maximizes the sum of "external links" of the vertices which compose it. For each path in the graph, we calculate the sum of the links from each vertex to nodes outside the vertices of the path. In case of equality on the sum, the method chooses the shortest path, which maximizes the average of the external links of each vertex.



In fact, this strategy would allow the goat to take the paths where it will have the best chance of eating a cabbage.

Stratégies du collecteur de Choux

Three Strategies are implemented for the Cabbage Collector:

- A **naive** strategy : Naive-cabbage (Easy Level)
- A **semi-naive** strategy : Random-anticipation (Normal Level)
- An **anticipation** strategy : Max-deg-anticipation

These three strategies can be summarized as follows.

1 - Naive cabbage

The first strategy is relatively simple and very naive.
Among all the cabbages on the board, the method randomly selects as many as the collector's harvest speed.

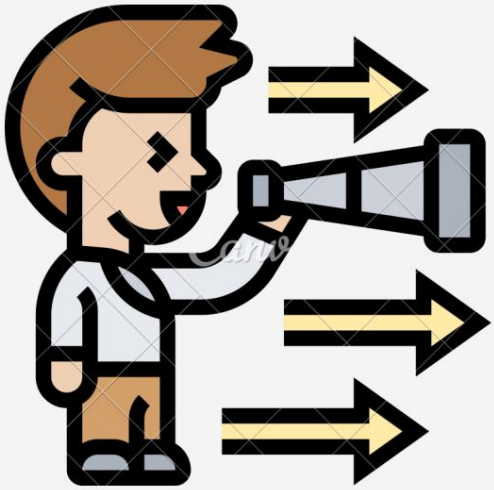
This strategy is not at all effective since it can allow the goat to win on the first try (if the cabbage collector leaves cabbages on the goat's neighboring peaks).

Stratégies du collecteur de Choux

2 - Random anticipation

This second strategy is relatively intuitive. It allows you to randomly anticipate the journey of the graph by the goat by attacking the nodes located in depth.

The method which implements this strategy first removes the neighboring cabbages from the goat, then randomly chooses cabbages located at a distance of at least 2 edges from the goat to complete the set of cabbages to be harvested for its round.



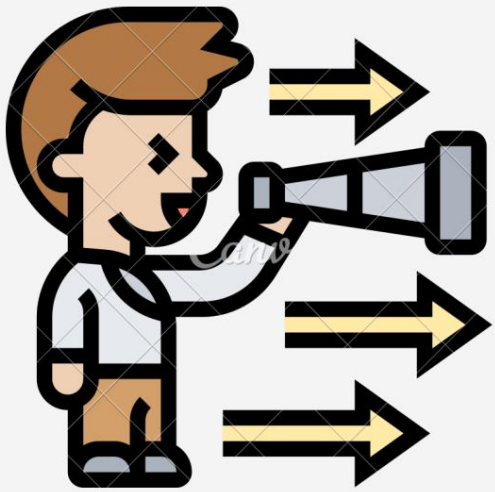
This strategy is effective as long as the goat does not fall on a peak of higher degree than the cabbage collector's harvest speed.

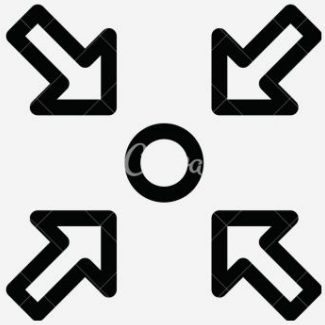
Stratégies du collecteur de Choux

3 - Max-deg-anticipation

This last strategy is also relatively intuitive. It makes it possible to anticipate the journey of the graph by the goat by attacking the highest degree nodes located in depth.

The method that implements this strategy first removes the neighboring sprouts from the goat, then randomly chooses the neighbors of the sprouts located on the highest degree vertex.





This strategy is effective as long as the goat does not fall on a peak of higher degree than the cabbage collector's harvest speed.