

1 The course of my research

At the beginning, it took me a long time to choose a subject, and to find a topic which would be interesting to work on. Then, I started to look at combinatorial games : how to be sure to win a game ? I found a thesis, written by Eric Duchêne in 2006, in which combinatorial games were well explained. For few weeks, I made research, a lot of theory on graphs, but, 2 weeks before the final presentation of my TIPE, I still hadn't practised ! I finally decided to work on the Pic'Arêtes, a game which is presented by Eric Duchêne in his thesis, and is played on a graph. He explains how to win, given by the configuration of the game at the beginning. It uses a lot of complicated mathematics, and I didn't have time to work on them. But Eric Duchêne uses a notation (which I put later), and I decided to write a program on Ocaml, which gives, for a given graph, its notation.

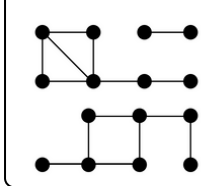
2 Combinatorial Games

- 2 players who play alternately
- finite number of configurations
- total information for each player
- no chance
- no draw
- winner = last to play

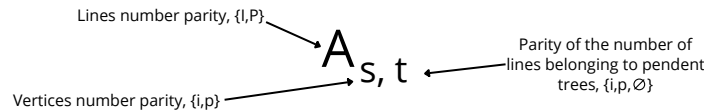
3 Pic'Arêtes Game (Vertex picking game)

- Rules : Each player picks a line from the graph. When it freed a vertex, the player wins a point. The goal is to collect the more points than your opponent.
- is a combinatorial game

example of a game board (a graph) :



A graph is said to be connected if it is in one piece.
For each connected subgraph of the main graph,
we introduce a notation :



My goal was to write a program which returns the notation of a connected graph.
I did 3 programs : one for each requisite parity.
The ones for the lines number and vertices number parities were quite easy and I finished them quickly. But the one about pendant trees was more difficult, and I spent a long time to work on it. I finally didn't succeed, because each time it was coming to a loop.

4 Next year

At the end, I'm far from concluding, and have no answer for my key question yet. I think I will keep working on combinatorial games, because I found them really interesting, and it is a good subject to link maths and computer science. I hope I will find a solution to my problem, maybe during holidays....!

How to
win at
Pic'Arêtes ?