

Games Developed in Java for Teaching “Combinatorial Game Theory”

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ABSTRACT

In this poster we develop some games in java, and we give the mathematical theory necessary to obtain an optimal strategy to play. This games are “Scoring Cards”, “Wythoff”, and “Twins”; they frame within the course about “Combinatorial Game Theory”, in which we applied a new method of learning, motivating to the student to make a work on the one hand cooperative, and by another competitive one. They will have to develop different strategies in games and they will try to win to each other.

Categories and Subject Descriptors

K.3.2 [Computer science education].

General Terms: Experimentation, Theory.

Keywords: Combinatorial game theory.

1. THE SUBJECT

Combinatorial Game theory is a mathematical discipline that studies two-player, zero-sum games, where the players play sequentially and there is perfect information and no chance. The aim of this subject is to build mathematical theories that help to win combinatorial games. The subject’s program is: Introduction to Combinatorial Games. Sprague-Grundy Function. The Curious Field On_2 : Nim-Addition and Nim-Multiplication. The Selective Rules, the Conjunctive Rule and the Disjunctive Rule. Draws on Games. Partisan Combinatorial Games.

For each one of these lesson the theoretical part is exposed, some exercises are solved applying this theory and a project by equipment is developed that consists of the construction of an interactive game in Maple (a Maplet) implementing some of the given strategies in theory. Matches are made in which each game competes with the rest, obtaining from each lesson a classification by equipment.

2. THE GAMES

In this poster we displayed three games constructed in java: “Scoring Cards”, “Wythoff” and “Twins” that correspond respectively to the projects of the lessons: “Introduction to Combinatorial Games”, “Sprague-Grundy Function” and “Nim-Addition”. The figures show a position of each applet.



Figure 1: Scoring Cards.



Figure 2: Wythoff

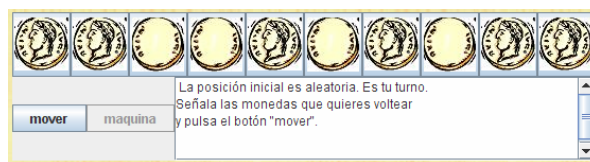


Figure 3: Twins

3. CONCLUSION

We thought that the described process of education, which consists of a mixture of traditional education with the work in groups, and a later competition between the different groups, motivates the student to dedicate more time to prepare the theoretical part of the subject.

4. REFERENCES

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