



How to Introduce the Basis of Algorithmics? Thanks to the Enumeration and Composition of All Riffle Shuffles from a N Card Deck Used in MathMagic

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ABSTRACT

Why use magic for teaching combinatory, algorithms and finally informatics basis as tables, control structure, loops and recursive function? Magicians know that once the surprise has worn off, the audience will seek to understand how the trick works. The aim of every teacher is to interest their students, and a magic trick will lead them to ask ' how?' and ' why?' and ' how can I create one myself?' In this article we consider a project I presented in 2009, the subject of which was ' How many riffle shuffles does exist from a N card deck? Find the composition of each possible riffle shuffle' . The aim of the paper is not only to describe the project scope, the students' theoretical studies, their approach to this problem and their computer realizations, but also to give ideas for a course or project using pedagogy. That is why only remarkable students' realizations are shown. In order to complete the given project, the students must answer three steps: the first one is to answer to the following question: " how can I find all possible riffle shuffles with few cards? (for exe*ample 3, 4 or 5 cards) the second one (to go further) is to answer to the following question " how can I generalize this solution through an algorithm?" the last one (to obtain the results!) is to program the algorithm with a recursive and a non-recursive solution). Each step of the Matlab? solution code is associated with an informatics basis. Whatever the student's professional ambitions, they will be able to see the impact that originality and creativity have when combined with an interest in one' s work. That' s why, two ameliorations of the ' basic' algorithm are proposed and a study of the gain thanks to these ameliorations is done. The students know how to " perform" a magic trick for their family and friends thanks to the use of riffle shuffle in Gilbreath' s principles, a trick that they will be able to explain and so enjoy a certain amount of success with. Sharing a mathematical/informatics demonstration is not easy and the fact that they do so means that they will have worked on and understood and are capable of explaining this knowledge. Isn' t this the aim of all teaching?

KEYWORDS

Higher Education; Engineer; Educational Method; Informatics; Algorithm

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