

Problems

Backtracking algorithms

Problem 39

Being A a group of n different integer values. Given two integer values m and C , being $m < n$, design and algorithm using backtracking (recursive and iterative versions) which finds all subgroups of A which contain exactly m elements and that the sum of those m elements is C .

Problem 40

In this problem we want to help two partners dissolve a commercial partnership. The trading company has n assets and each asset is associated with a positive value (profit). The partners want to distribute these n assets between them so that each partner gets exactly half the value (profit) of the company. Design an algorithm with backtracking (recursive and iterative versions) to find all possible distributions of the assets. Determine if there is a strategy to find an optimal distribution. For example consider the following assets:

Asset	1	2	3	4	5	6	7	8	9	10
Value	10	9	5	3	3	2	2	2	2	5

Problem 41

A new school must teach n courses. It has n classrooms and n teachers. Design an algorithm with backtracking (recursive and iterative versions) which finds an assignment of classroom and teacher for each course. Assume that each course has a different number of students, that each classroom has a limited capacity and that each teacher has a speciality which limits its idoneity to teach certain courses. Also assume that you have two methods which return boolean values:

- The method `validate(classroom, course)` returns true if the classroom is adequate for that course.
- The method `speciality(teacher, course)` returns true if the teacher is a specialist in the course contents.

Problema 42

Consider n different letters. Design an algorithm with backtracking (recursive and iterative versions) which finds all the words of length m , with $m < n$, without repeating letters.

Problem 43

Consider n different types of stamps with 3 stamps for type. Consider also that each card needs to have exactly m stamps being $m \leq n * 3$. Design an algorithm with backtracking (recursive and iterative versions) which finds all the possible ways of sending the card if the order of the stamps doesn't matter.

Problem 44

Consider a board with $n*n$ positions and a group of n colors. A latin square of $n * n$ is a board where each color never repeats in the same row and column. Design an algorithm with backtracking (recursive and iterative versions) which shows all latin squares of $n * n$ which can be obtained with n different colors.