

Greedy Gray Codes and Pancake Flipping

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Abstract

The generation of combinatorial objects like permutations, necklaces, trees and graphs is a fundamental pursuit in . . . Combinatorics! Given a set of objects, like all permutations given n , the goal is to develop an efficient algorithm to exhaustively list each permutation exactly once. If each successive permutation in the listing differs by a single operation (or a constant amount of change), we call the listing a *Gray code*. In this talk, we will discuss a surprisingly new way to look at Gray codes – from a Greedy perspective.

As an application, we consider a variation of the famous *Pancake Flipping Problem*, even when the pancakes are burnt on one side. In this problem, the goal is to iterate through all possible stacks of n different sized pancakes by only using a spatula and flipping part of the stack at each step. As an example, the following figure illustrates a listing of all pancake stacks for $n = 5$.



For all those interested in Graph Theory, we will consider an application on the pancake network (below) and discuss an open problem regarding spanning trees.

