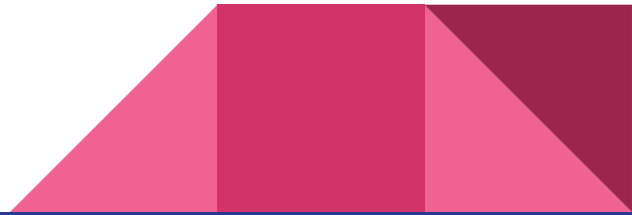
Recursive Backtracking

The Backtracking Checklist

- **Find what choice(s) we have at each step.** What different options are there for the next step?
- For each valid choice:
  - **Make it and explore recursively.** Pass the information for a choice to the next recursive call(s).
  - **Go back after exploring.** Restore everything to the way it was before making this choice.
- Find the base case(s). What should we do when we are out of decisions?



groupSum

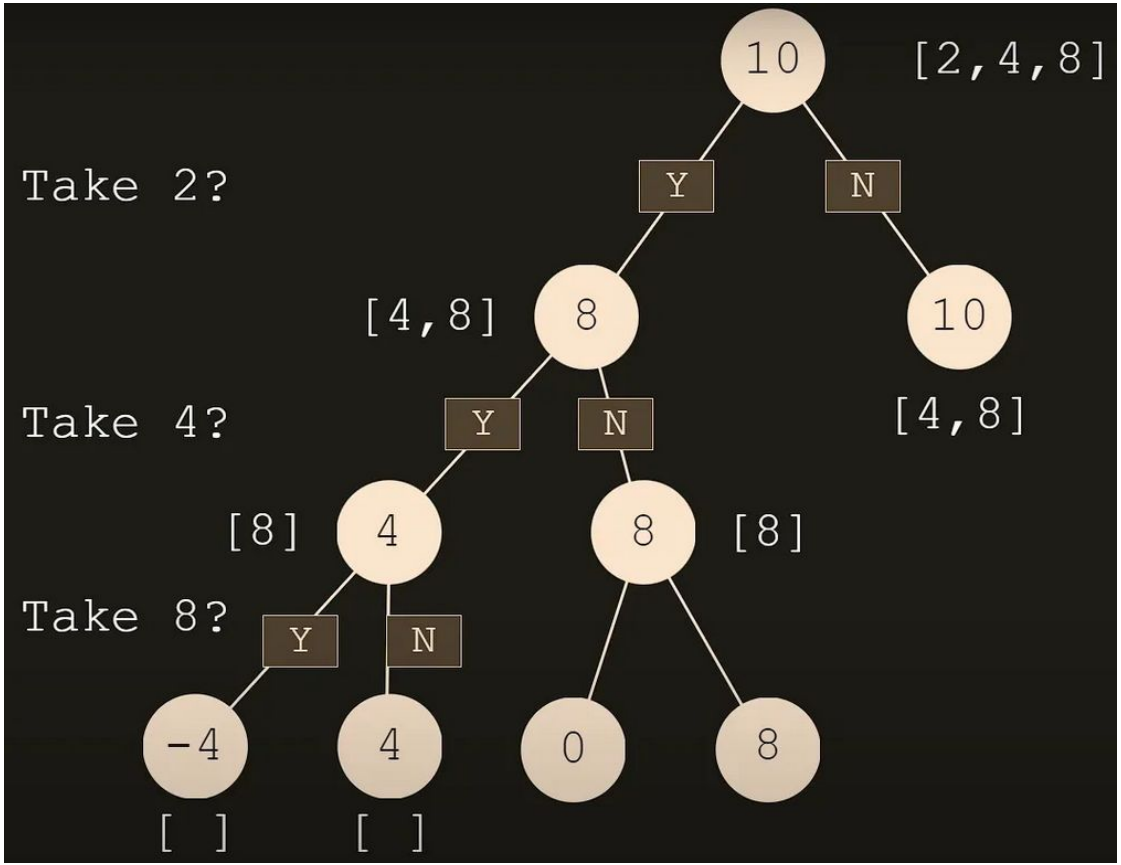
Given an array of ints, is it possible to choose a group of some of the ints, such that the group sums to the given target? This is a classic backtracking recursion problem. Once you understand the recursive backtracking strategy in this problem, you can use the same pattern for many problems to search a space of choices. Rather than looking at the whole array, our convention is to consider the part of the array starting at index **start** and continuing to the end of the array. The caller can specify the whole array simply by passing start as 0. No loops are needed -- the recursive calls progress down the array.

groupSum(0, [2, 4, 8], 10) → true
groupSum(0, [2, 4, 8], 14) → true
groupSum(0, [2, 4, 8], 9) → false

public boolean groupSum(int start, int[] nums, int target) {}

Hint:

The base case is when start>=nums.length. In that case, return true if target==0. Otherwise, consider the element at nums[start]. The key idea is that there are only 2 possibilities -- nums[start] is chosen or it is not. Make one recursive call to see if a solution is possible if nums[start] is chosen (subtract nums[start] from target in that call). Make another recursive call to see if a solution is possible if nums[start] is not chosen. Return true if either of the two recursive calls returns true.



Source: Daniel Sutantyo

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