Array Pattern-Based Problem Solving

1. Prefix Sum

Used to compute sum over subarrays efficiently. Often helps reduce time complexity from O(n^2) to O(n).

Common Problems: Subarray Sum Equals K, Range Sum Query

2. Kadane's Algorithm

Finds the maximum subarray sum in linear time.

Common Problems: Maximum Subarray, Maximum Sum Circular Subarray

3. Hashing / Frequency Maps

Count frequencies, detect duplicates, and find elements appearing certain number of times.

Common Problems: Two Sum, Majority Element, Top K Frequent Elements

4. Sorting + Binary Search

Sort the array to use binary search for optimizations.

Common Problems: Kth Largest Element, Search in Rotated Sorted Array

5. Difference Array

Optimizes range update operations. Efficient for applying increments over ranges.

Common Problems: Range Addition, Flight Booking

6. Monotonic Stack (for Arrays)

Used to solve next greater/smaller element problems in O(n).

Common Problems: Daily Temperatures, Largest Rectangle in Histogram

7. Sliding Window (Fixed/Variable)

Optimizes problems involving subarrays by reducing brute force time.

Common Problems: Maximum Subarray of Size K, Longest Substring Without Repeating Characters

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8. Two Pointers

Used with sorted arrays for finding pairs or compressing arrays.

Common Problems: Remove Duplicates, 3Sum

9. Greedy on Arrays

Choose locally optimal elements for globally optimal results.

Common Problems: Jump Game, Gas Station

10. Binary Search on Answer

Binary search in the space of answers, not on array elements directly.

Common Problems: Minimize Max Distance to Gas Station, Aggressive Cows

11. In-Place Modification

Update array without extra space, usually asked with constraints.

Common Problems: Move Zeroes, Set Matrix Zeroes

12. Matrix as 2D Array

Handle matrix row-wise or column-wise.

Common Problems: Spiral Matrix, Rotate Image

13. Merge Intervals (if intervals given in array)

Handle overlapping intervals efficiently after sorting.

Common Problems: Merge Intervals, Insert Interval