# 20 Coding Patterns to master MAANG Interviews



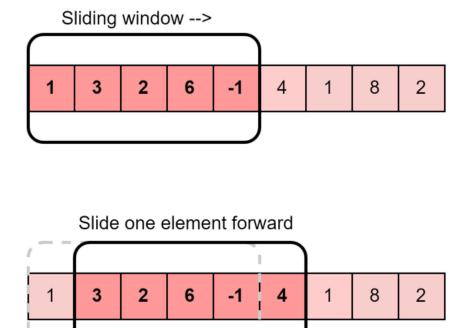
→ What if you don't like to solve 100s of coding questions before your interview?

→ Don't just LeetCode; follow these20 Coding Patterns instead.

# 1. Sliding Window

**Usage**: This algorithmic technique is used when we need to handle the input data in a specific window size.

**DS Involved**: Array, String, HashTable



- Longest Substring with 'K' Distinct Characters
- Fruits into Baskets



## 2. Islands (Matrix Traversal)

**Usage**: This pattern describes all the efficient ways of traversing a matrix (or 2D array).

**DS Involved**: Matrix, Queue

1	1	1	0	0
0	1	0	0	1
0	0	1	1	0
0	0	1	0	0
0	0	1	0	0

- Number of Islands
- Flood Fill
- Cycle in a Matrix



## 3. Two Pointers

**Usage**: This technique uses two pointers to iterate input data. Generally, both pointers move in the opposite direction at a constant interval.

**DS Involved**: Array, String, LinkedList



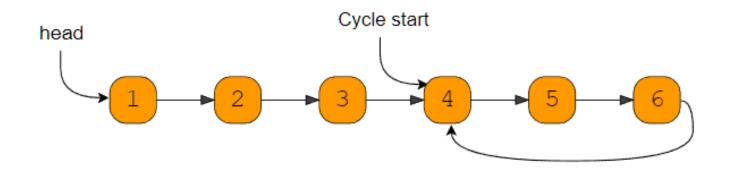
- Squaring a Sorted Array
- Dutch National Flag Problem
- Minimum Window Sort



## 4. Fast & Slow Pointers

**Usage**: Also known as Hare & Tortoise algorithm. This technique uses two pointers that traverse the input data at different speeds.

**DS Involved**: Array, String, LinkedList



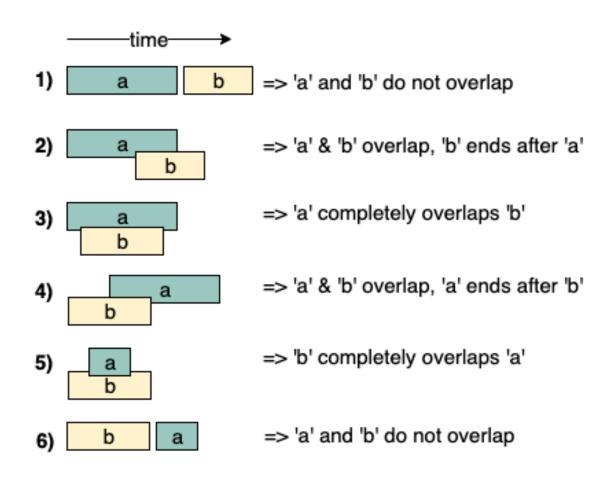
- Middle of the LinkedList
- Happy Number
- Cycle in a Circular Array



# 5. Merge Intervals

**Usage**: This technique is used to deal with overlapping intervals.

**DS Involved**: Array, Heap



- Conflicting Appointments
- Minimum Meeting Rooms



# 6. Cyclic Sort

**Usage**: Use this technique to solve array problems where the input data lies within a fixed range.

**DS Involved**: Array

- Find all Missing Numbers
- Find all Duplicate Numbers
- Find the First K Missing Positive Numbers



# 7. In-place Reversal of a LinkedList

**Usage**: This technique describes an efficient way to reverse the links between a set of nodes of a LinkedList. Often, the constraint is that we need to do this in-place, i.e., using the existing node objects and without using extra memory.

**DS Involved**: LinkedList

- Reverse every K-element Sub-list
- Rotate a LinkedList



## 8. Breadth-First Search

**Usage**: This technique is used to solve problems involving traversing trees or graphs in a breadth-first search manner.

**DS Involved**: Tree, Graph, Matrix, Queue

- Binary Tree Level Order Traversal
- Minimum Depth of a Binary Tree
- Connect Level Order Siblings



# 9. Depth First Search

**Usage**: This technique is used to solve problems involving traversing trees or graphs in a depth-first search manner.

**DS Involved**: Tree, Graph, Matrix

- Path With Given Sequence
- Count Paths for a Sum



# 10. Two Heaps

**Usage**: In many problems, we are given a set of elements that can be divided into two parts. We are interested in knowing the smallest element in one part and the biggest element in the other part. As the name suggests, this technique uses a Min-Heap to find the smallest element and a Max-Heap to find the biggest element.

**DS Involved**: Heap, Array

- Find the Median of a Number Stream
- Next Interval



## 11. Subsets

**Usage**: Use this technique when the problem asks to deal with permutations or combinations of a set of elements.

**DS Involved**: Queue, Array, String

- String Permutations by changing case
- Unique Generalized Abbreviations



# 12. Modified Binary Search

**Usage**: Use this technique to search a sorted set of elements efficiently.

**DS Involved**: Array

- Ceiling of a Number
- Bitonic Array Maximum



## 13. Bitwise XOR

**Usage**: This technique uses the XOR operator to manipulate bits to solve problems.

**DS Involved**: Array, Bits

- Two Single Numbers
- Flip and Invert an Image



# 14. Top 'K' Elements

**Usage**: This technique is used to find top/smallest/frequently occurring 'K' elements in a set.

**DS Involved**: Array, Heap, Queue

- 'K' Closest Points to the Origin
- Maximum Distinct Elements



# 15. K-way Merge

**Usage**: This technique helps us solve problems that involve a list of sorted arrays.

**DS Involved**: Array, Queue, Heap

- Kth Smallest Number in M Sorted Lists
- Kth Smallest Number in a Sorted Matrix



# 16. Topological Sort

**Usage**: Use this technique to find a linear ordering of elements that have dependencies on each other.

DS Involved: Array, HashTable, Queue, Graph

- Tasks Scheduling
- Alien Dictionary



## 17. 0/1 Knapsack

**Usage**: This technique is used to solve optimization problems. Use this technique to select elements that give maximum profit from a given set with a limitation on capacity and that each element can only be picked once.

**DS Involved**: Array, HashTable

- Equal Subset Sum Partition
- Minimum Subset Sum Difference



## 18. Fibonacci Numbers

**Usage**: Use this technique to solve problems that follow the Fibonacci numbers sequence, i.e., every subsequent number is calculated from the last few numbers.

**DS Involved**: Array, HashTable

- Staircase
- House Thief



# 19. Palindromic Subsequence

**Usage**: This technique is used to solve optimization problems related to palindromic sequences or strings.

**DS Involved**: Array, HashTable

- Longest Palindromic Subsequence
- Minimum Deletions in a String to make it a Palindrome



# 20. Longest Common Substring

**Usage**: Use this technique to find the optimal part of a string/sequence or set of strings/sequences.

**DS Involved**: Array, HashTable

- Maximum Sum Increasing Subsequence
- Edit Distance



- → Follow these techniques to distinguish yourself from others!
- → All these patterns are discussed in "Grokking the Coding Interview" and "Grokking Dynamic Programming" from **DesignGurus.org**