DSA Patterns

🧠 Pattern	💡 Real-Life Analogy	📍 Solves
Sliding Window	"Peeking through a moving window"	Longest Substring, Max Sum Subarray, Anagrams
Two Pointers	"2 fingers walking toward each other"	2Sum, Reverse Vowels, Sorted Square, Palindrome Check
Fast & Slow Pointers	"Tom & Jerry: one fast, one slow 🐭🐱"	Linked List Cycle, Happy Number
Binary Search	"Guess the number in 7 tries or less"	Rotated Array, First/Last Position, Koko Eating Bananas
DFS / BFS	"DFS: Go deep. BFS: Go wide."	Graph Traversals, Flood Fill, Word Ladder, Shortest Path
Backtracking	"Trying all outfits before choosing one 👗"	Sudoku, N-Queens, Word Search, Permutations
Dynamic Programming	"Why re-solve what you've already solved?"	Knapsack, House Robber, LIS, Edit Distance
Greedy	"Always pick what seems best right now"	Activity Selection, Jump Game, Gas Station
Union-Find (DSU)	"Friend circles detection 👭"	Number of Provinces, Kruskal's MST, Connected Components
Topological Sort	"Finish A before B 📦"	Course Schedule, Task Scheduling
Prefix Sum / Difference Array	"Running totals like bank statements 💸"	Range Sum, Subarray Sum Equal K, Rainwater Trapping
Monotonic Stack / Queue	"Stacking plates or tallest first 🍽️"	Next Greater Element, Daily Temperatures, Largest Rectangle
Bit Manipulation	"Flip switches to solve puzzles ⚫"	Single Number, Count Bits, Subsets, XOR problems
Trie (Prefix Tree)	"Autocomplete dictionary 📚"	Word Search, StartsWith, Replace Words
Heap / Priority Queue	"Serve most urgent first ⏳"	Kth Largest, Top K Elements, Merge K Lists
Graph (Adjacency List/Matrix)	"Follow paths on a map 🗺️"	Shortest Path, Cycles, Connected Components
Recursion	"Function calling itself — like Russian dolls 🪆"	Tree Problems, Factorial, Subsets, Merge Sort
Segment Tree / Fenwick Tree	"Smart range queries 📊"	Range Sum/Min/Max, Updates on Array
Matrix Traversal	"Walk in all directions 🧭"	Spiral Order, Island Count, Diagonal Traversals
Hashing / HashMap	"Lookup table memory 📒"	2Sum, Group Anagrams, Frequency Counts