



GROKKING THE CODING INTERVIEW

Don't Just LeetCode; Follow the Coding Patterns Instead

What if you don't like to practice 100s of coding questions before the interview?

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Coding Interviews are getting harder. To prepare for coding interviews, you will need weeks, if not months of preparation.

No one likes spending that much time preparing for the coding interviews. So is there a smarter solution?

First, let's look at the problem.

Anyone preparing for coding interviews definitely knows LeetCode. It is probably the biggest online repository for coding interview questions. Let's take a look at what problems people face when using LeetCode.

Top highlight

Problems with LeetCode

There are around 3k problems in LeetCode. The biggest challenge with LeetCode is its lack of organization; it has a huge set of coding problems, and you are not sure where to start or what to focus on.

One wonders, is there an adequate number of questions one should go through to consider themselves prepared for the coding interview?

I would love to see a streamlined process that guides me and teaches me enough algorithmic techniques to feel confident for the interview. As a lazy

enough algorithmic techniques to feel confident for the interview. As a lazy person myself, I wouldn't like to go through even 500 questions.

The Solution

One technique that people often follow is to solve questions related to the same data structure; for example, focusing on questions related to Arrays, then LinkedList, HashMap, Heap, Tree, Graph, or Trie, etc. Although this does provide some organization, it still lacks coherence. For example, many questions can be solved using HashMap but still require different algorithmic techniques.

I would love to see question sets that follow not only the same data structure but also similar algorithmic techniques.

The best thing I came across was the problem-solving patterns like Sliding Window, Fast and Slow Pointers, Two Pointers, Two Heaps, Topological Sort, etc. [Following these patterns](#) helped me nurture my ability to ‘map a new problem to an already known problem’. This not only made this whole coding-interview-preparation process fun but also a lot more organized.

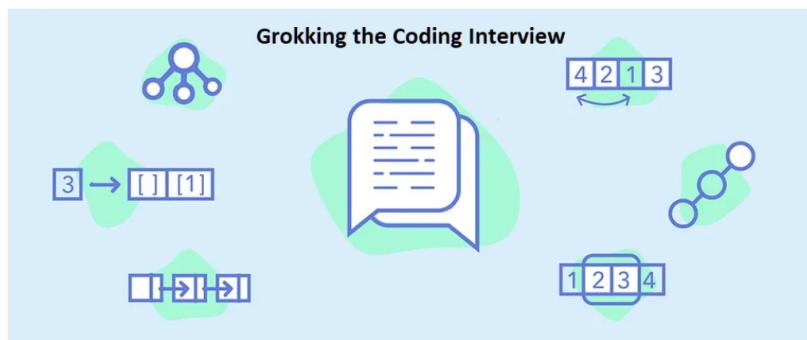
Coding patterns enhance our “ability to map a new problem to an already known problem.”

Coding Patterns

I have gathered around 20 of these coding problem patterns that I believe can help anyone learn these beautiful algorithmic techniques and make a real difference in the coding interviews.

The idea behind these patterns is that once you’re familiar with a pattern, you’ll be able to solve dozens of problems with it. For a detailed discussion of these patterns and related problems with solutions, take a look at [Grokking the Coding Interview](#).

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So, without further ado, let me list all these patterns:

1. Sliding Window
2. Islands (Matrix Traversal)

3. Two Pointers

4. Fast & Slow Pointers

5. Merge Intervals

6. Cyclic Sort

7. In-place Reversal of a LinkedList

8. Tree Breadth-First Search

9. Tree Depth First Search

10. Two Heaps

11. Subsets

12. Modified Binary Search

13. Bitwise XOR

14. Top 'K' Elements

15. K-way Merge

16. Topological Sort

17. 0/1 Knapsack

18. Fibonacci Numbers

19. Palindromic Subsequence

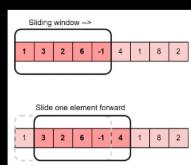
20. Longest Common Substring

Following is a small intro of each of these patterns with sample problems:

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



Sample Problems:

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

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2. Islands (Matrix Traversal)

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

DS Involved: Matrix, Queue



Sample Problems:

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

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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



Sample Problems:

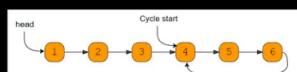
- Squaring a Sorted Array
- Dutch National Flag Problem
- Minimum Window Sort

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4. Fast & Slow Pointers

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

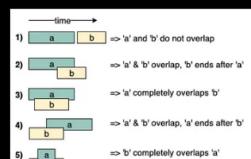
DS Involved: Array, String, LinkedList



5. Merge Intervals

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

DS Involved: Array, Heap

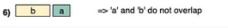


6. Cyclic Sort

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

DS Involved: Array

Sample Problems:

<p>Sample Problems:</p> <ul style="list-style-type: none"> Middle of the LinkedList Happy Number Cycle in a Circular Array <p>DesignGurus.org</p>	 <p>Sample Problems:</p> <ul style="list-style-type: none"> Conflicting Appointments Minimum Meeting Rooms <p>DesignGurus.org</p>	<ul style="list-style-type: none"> Find all Missing Numbers Find all Duplicate Numbers Find the First K Missing Positive Numbers <p>DesignGurus.org</p>
<h2>7. In-place Reversal of a LinkedList</h2> <p>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.</p> <p>DS Involved: LinkedList</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Reverse every K-element Sub-list Rotate a LinkedList <p>DesignGurus.org</p>	<h2>8. Breadth-First Search</h2> <p>Usage: This technique is used to solve problems involving traversing trees or graphs in a breadth-first search manner.</p> <p>DS Involved: Tree, Graph, Matrix, Queue</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Binary Tree Level Order Traversal Minimum Depth of a Binary Tree Connect Level Order Siblings <p>DesignGurus.org</p>	<h2>9. Depth First Search</h2> <p>Usage: This technique is used to solve problems involving traversing trees or graphs in a depth-first search manner.</p> <p>DS Involved: Tree, Graph, Matrix</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Path With Given Sequence Count Paths for a Sum <p>DesignGurus.org</p>
<h2>10. Two Heaps</h2> <p>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.</p> <p>DS Involved: Heap, Array</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Find the Median of a Number Stream Next Interval <p>DesignGurus.org</p>	<h2>11. Subsets</h2> <p>Usage: Use this technique when the problem asks to deal with permutations or combinations of a set of elements.</p> <p>DS Involved: Queue, Array, String</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> String Permutations by changing case Unique Generalized Abbreviations <p>DesignGurus.org</p>	<h2>12. Modified Binary Search</h2> <p>Usage: Use this technique to search a sorted set of elements efficiently.</p> <p>DS Involved: Array</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Ceiling of a Number Bitonic Array Maximum <p>DesignGurus.org</p>
<h2>13. Bitwise XOR</h2> <p>Usage: This technique uses the XOR operator to manipulate bits to solve problems.</p> <p>DS Involved: Array, Bits</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Two Single Numbers Flip and Invert an Image <p>DesignGurus.org</p>	<h2>14. Top 'K' Elements</h2> <p>Usage: This technique is used to find top/smallest/frequently occurring 'K' elements in a set.</p> <p>DS Involved: Array, Heap, Queue</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> 'K' Closest Points to the Origin Maximum Distinct Elements <p>DesignGurus.org</p>	<h2>15. K-way Merge</h2> <p>Usage: This technique helps us solve problems that involve a list of sorted arrays.</p> <p>DS Involved: Array, Queue, Heap</p> <p>Sample Problems:</p> <ul style="list-style-type: none"> Kth Smallest Number in M Sorted Lists Kth Smallest Number in a Sorted Matrix <p>DesignGurus.org</p>
<h2>16. Topological Sort</h2> <p>Usage: Use this technique to find a linear</p>	<h2>17. 0/1 Knapsack</h2> <p>Usage: This technique is used to solve problems involving knapsack problems where items have weights and values.</p>	<h2>18. Fibonacci Numbers</h2> <p>Usage: Use this technique to solve problems related to the Fibonacci sequence.</p>

ordering of elements that have dependencies on each other.

DS Involved: Array, HashTable, Queue, Graph

Sample Problems:

- Tasks Scheduling
- Alien Dictionary

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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

Sample Problems:

- Equal Subset Sum Partition
- Minimum Subset Sum Difference

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that follow the Fibonacci numbers sequence, i.e., every subsequent number is calculated from the last few numbers.

DS Involved: Array, HashTable

Sample Problems:

- Staircase
- House Thief

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19. Palindromic Subsequence

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

DS Involved: Array, HashTable

Sample Problems:

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

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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

Sample Problems:

- Maximum Sum Increasing Subsequence
- Edit Distance

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Coding Patterns

Conclusion

Like it or not, LeetCode-type questions are part of almost every programming interview, so every software developer should practice them before an interview. Their only option is to prepare smartly and learn problem-solving by focusing on the underlying problem patterns. Learn more about these patterns and sample problems in:

1. [Grokking Data Structures for Coding Interviews](#)
2. [Grokking the Coding Interview: Patterns for Coding Questions](#)
3. [Grokking Dynamic Programming for Coding Interviews](#)
4. [Grokking the Art of Recursion for Coding Interviews](#)
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Struggling with system design interviews? Unlock expert guidance, strategies, and practice questions to ace your...

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System Design Interview Survival Guide (2023): Preparation Strategies and Practical Tips

System Design Interview Preparation: Mastering the Art of System Design.

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Top LeetCode Patterns for FAANG Coding Interviews

The top topic is Array with 1142 problems, followed by String with 549 problems, and so on. Let's take a closer look at...

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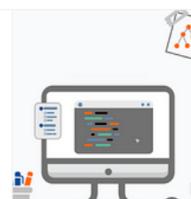
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What questions are asked in a system design interview?

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Written by Arslan Ahmad

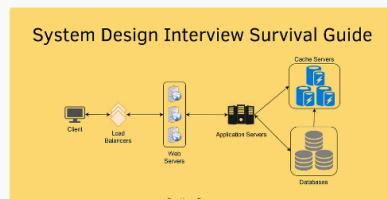
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- Developed Amazon check-out and payment services to handle traffic of 10 Million daily global transactions.
- Integrated frames for credit cards and bank accounts to secure 100% of all consumer traffic and prevent CSRF, XSS attacks.
- Led Year Transactions implementation for JavaScript front-end framework to showcase consumer transactions and reduce call center costs by \$25 Millions.
- Recovered failed Author check-out failure impacting 4000+ customers due to incorrect GET form redirection.

Projects

NinjaType (React)

- Platform to offer coding problems, practice with built-in code editor and writer + video solutions in React.
- Used Ngx to reverse proxy IP address on Digital Ocean hosts.
- Developed using styled-components for 95% CSS in-line to ensure proper CSS styling.
- Integrated React with Sequelize to safely run user submitted code with < 2.2 ms runtime.

HotMap (JavaScript)

- Visualized Google Takeout location data of location history using Google Maps API and Google Maps heatmap.
- Used local GIS system storage to reliably handle 5GB of location history data.
- Implemented Express to include routing between pages and jQuery to parse Google Map and implement heatmap visually.

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1-page. Well-formatted.

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 • Last Year Transaction implementation for Javascript front-end framework to showcase consumer transactions and reduce call center costs by \$25 Million
 • Received Saudi-Arabia checker failure injecting 400+ customers due to incorrect GET form redirection

Projects

NinjaDev (React)
 • Visualized specific coding problem practice with built-in code editor and writer + video solutions in React
 • Utilized Ngrok to reverse proxy IP addresses on Digital Ocean hosts
 • Developed using Styled-Components for 95% CSS styling to ensure proper CSS styling
 • Implemented a feature with SASS to safely run user submitted code with > 1.25 million lines of code

HealthMap Dashboard
 • Visualized Google Takeout location form of location history using Google Maps API and Google Maps heatmap code with React
 • Implemented a system to store and reliably handle tens of millions of location history data
 • Implemented Express to include routing between pages and jQuery to parse Google Map and implement heatmap overlay



Alexander Nguyen in Level Up Coding

The resume that got a software engineer a \$300,000 job at Google.

1-page. Well-formatted.

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Carlos Arguelles

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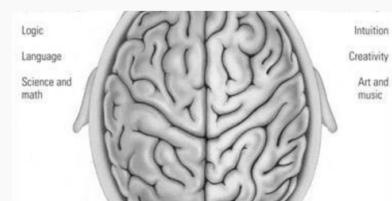


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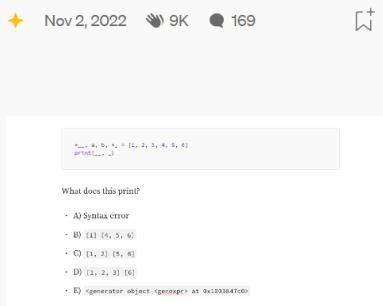
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Liu Zuo Lin

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