| **Data Structure Workouts** |
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| 1. Learn what is Data Structure & Algorithms. 2. Learn the basics of Memory Allocation and Memory leak. 3. Learn the concept of Complexity Analysis.   NB: The complexity of common operations of all data structures should be covered.   1. Learn about Asymptotic analysis (Big-O notation). 2. Learn the concepts of Array. Complete at least three sample workouts & do at least 3 problems from any competitive coding websites (Hacker Rank, Code Chef, Leet code, Algo Expert, etc.) 3. Learn the concepts of the Linked list. Complete at least three sample workouts    1. Construction of Singly linked list & Doubly linked list.    2. Convert array to a linked list    3. Add a node at the end & beginning    4. Delete node with the value specified    5. Insert a node after & before a node with x data    6. Print all elements by order & reverse by order    7. Write a program to remove duplicates in a sorted singly linked list 4. Learn the concepts of String. Complete at least three sample workouts.   Eg: Write a function to replace each alphabet in the given string with another alphabet occurring at the n-th position from each of them.   1. Learn about Linear Search & Binary Search. Complete at least 3 sample workouts in each of them 2. Learn the concepts of Recursion. Complete at least 3 sample workouts. 3. Learn about the applications of all structures you covered this week |
| *Write a short description about this task*  *Data structures refer to the way data is organised and stored in a computer's memory,*  *while algorithms are step-by-step procedures used to solve problems and perform*  *Computations. The use of data structures and algorithms is essential for efficient and*  *optimised programming. By using the right data structures and algorithms,*  *programmers can improve the speed and efficiency of their programs* |
| *Write a short description about this task*  *Learning the basics of memory allocation and memory leak is essential for programmers who want to develop efficient, stable, and reliable software. Memory allocation is the process of setting aside a specific amount of memory for a program to use, while memory leak occurs when a program does not release allocated memory, leading to wasted resources and potential crashes. Understanding memory allocation helps programmers optimize program performance, reduce memory waste, and avoid program crash* |
| *Write a short description about this task*  *Learning the concept of complexity analysis is a fundamental aspect of computer science and is essential for developing efficient algorithms. Complexity analysis involves analysing the amount of time and resources required by an algorithm to solve a problem. It helps in designing algorithms that are scalable and efficient, allowing for faster computation times and better use of resources. By understanding the complexity of different algorithms, developers can identify the best algorithm for a particular problem and optimise existing algorithms for better performance.* |
| *Write a short description about this task*  *Learning about asymptotic analysis and the use of Big-O notation is crucial in analyzing the efficiency and scalability of algorithms. Asymptotic analysis involves studying the behavior of algorithms as the input size grows towards infinity. Big-O notation is a mathematical notation used to describe the upper bound of the growth rate of a function. By using Big-O notation, we can describe the efficiency of an algorithm in terms of how quickly its running time grows relative to the size of the input. This helps in identifying the best algorithm for a particular problem, as well as in optimizing existing algorithms to improve their performance.* |
| *Write a short description about this task*  *Learning the concepts of arrays is important in computer programming and data analysis because arrays are a fundamental data structure used to store and manipulate collections of data. Understanding arrays can help programmers and analysts solve problems more efficiently and write more effective and scalable code.*  *Link to the folder containing code and screenshot of the output*  [*https://drive.google.com/drive/folders/1mfFhgmIfZ7COytyZBBusUaFMsrvFo7jT?usp=share\_link*](https://drive.google.com/drive/folders/1mfFhgmIfZ7COytyZBBusUaFMsrvFo7jT?usp=share_link) |
| *Write a short description about this task*  *Learning the concepts of linked lists is important in computer programming and data analysis because linked lists are a fundamental data structure used to store and manipulate collections of data in a dynamic and efficient way.*  *Linked lists allow for constant-time insertion and deletion of elements, unlike arrays which require costly memory reallocation when elements are added or removed. They also allow for efficient memory usage as only the necessary amount of memory is allocated for each element.*  *Link to the folder containing code and screenshot of the output*  [*https://drive.google.com/drive/folders/14rRcTg6\_nNDvzhEcARq-riDCByKAXzLj?usp=share\_link*](https://drive.google.com/drive/folders/14rRcTg6_nNDvzhEcARq-riDCByKAXzLj?usp=share_link) |
| *Write a short description about this task*  *Learning about string data structures is important in computer programming and data analysis because strings are a fundamental data type used to represent text or character data. Understanding string data structures can help programmers and analysts solve problems more efficiently and write more effective and scalable code.*  *Link to the folder containing code and screenshot of the output*  [*https://drive.google.com/drive/folders/1PdNb82SR85iImQo6f-1fWqjWDyDEk-UK?usp=share\_link*](https://drive.google.com/drive/folders/1PdNb82SR85iImQo6f-1fWqjWDyDEk-UK?usp=share_link) |
| *Write a short description about this task*  *Learning the concepts of linear search and binary search is important in computer programming and data analysis because they are fundamental searching algorithms used to find specific elements within a collection of data.*  *By understanding linear search and binary search, you will be better prepared to work with collections of data in your programming or data analysis projects, and you will have a deeper understanding of how to solve real-world problems using searching algorithms.*  *Link to the folder containing code and screenshot of the output*  [*https://drive.google.com/drive/folders/1vq2ZyjLWqGDq8-9PZEcAeMDFFj2y9yXM?usp=share\_link*](https://drive.google.com/drive/folders/1vq2ZyjLWqGDq8-9PZEcAeMDFFj2y9yXM?usp=share_link) |
| *Write a short description about this task*  *Learning the concepts of recursion is important in computer programming and data analysis because recursion is a fundamental technique used to solve complex problems by breaking them down into smaller, more manageable subproblems. Understanding recursion can help programmers and analysts solve problems more efficiently and write more effective and scalable co*  *Link to the folder containing code and screenshot of the output*  [*https://drive.google.com/drive/folders/1qPJYTByoYx\_P\_l-wMgRkMcCzk8oRk5Lm?usp=share\_link*](https://drive.google.com/drive/folders/1qPJYTByoYx_P_l-wMgRkMcCzk8oRk5Lm?usp=share_link) |
| *Write a short description about this task* |
| *Each data structure have use in different application and it will give maximum performance*  *And efficient when they are used in their aspects . moreover datastructures are used to*  *Optimise complexity and give the best output at limited time and slimited space .*  *Arrays are mainly used for calculation purpose and storing and manipulating data .*  *Linked list is used in cases like avoid wastage and achieve maximum out put . the examples are in the os systems and file systems are used it for maximum efficiency.*  *While strings are used in basic data processing and concat split trim data .*  *Recursion is used for high purposes like machine learning artificial intelligence like that*  *And Bineary search is used to optimise the searching speed . its also used place like needed* |
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