ALGORITHM LAB
COUSE CODE: CSE214
Assignment I

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Short Notes on Optimization

Optimization is a program transformation technique, which tries to improve the code by making it consume less resources (i.e. CPU, Memory) and deliver high speed. It's also a part of dynamic programming. Where we are finding minimum, maximum, longest path, shortest path; we use optimization.

Level of Optimization

1. Design Level
2. Algorithms and Data Structure
3. Source Code Level
4. Build Level
5. Compile Level
6. Assembly Level And many more

Optimization Can Be Achieved By:

1. Choosing the appropriate algorithm.

2. Using memory efficiently.

3. Choosing the right data structures.

4. Using optimization methods like Dynamic Programming.

Different Algorithms I know

Number Theoretic Algorithms

1. Sieve of Eratosthenes

2. Segmented Sieve

3. Prime Factorization $O(\sqrt{n})$

4. SOD and NOD (Number and Summation of Divisors)

5. Euclid GCD

Sorting Algorithms

1. Insertion Sort

2. Selection Sort

3. Quick Sort

4. Bubble Sort

5. Merge Sort

Searching Algorithms

1. Linear Search

2. Binary Search

Dynamic Programming Algorithms

1. Coin change

2. Bin Packing Algorithm

3. 01 Knapsack Algorithm

Why We Need So Many Algorithms

In a time where technological advancements and inventions are so rapid than why we need so many algorithms, as we have much faster machines and hardware than past?? Algorithms are limitless and it's a quest to find the best way of solving a problem. If we talk about simple sorting algorithms, one algorithm can sort any data, right?? Let's say we have to sort an array and heapsort is best in this case but if we have to sort an almost sorted array than we can use insertion sort in the other hand quicksort has excellent average case behavior and poor worst-case performance.

But we won't even understand the great optimization we achieve if we don't study them and try to use the best one according to the scenario.