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COURSE: CSI-227

Dept : CSE

Sub : Algorithm

Ans: to the Q: NO: 01

(a) Algorithm: - In mathematics and Computer science an algorithm is a finite sequence of rigorous instructions, typically used to solve a class of specific problems or to perform a computation.

Algorithms are used as specifications for performing calculations and data processing.

Categories of Algorithm:-

There are 7 types of algorithm.

1. Brute force Algorithm

2. Recursive Algorithm

3. Dynamic Programming Algorithm.

4. Divide and Conquer Algorithm.

5. Greedy Algorithm.

6. Backtracking Algorithm.

7. Randomized Algorithm.

Characteristics of an Algorithm:

There are some characteristics which every algorithm should follow.

There are five different characteristics which deal with various aspects of algorithm.

They are follows:

1. Input specified \rightarrow The algorithm receives input.
2. Output specified \rightarrow The algorithm produces output.
3. Definiteness \rightarrow The steps are precisely stated.
4. Effectiveness \rightarrow Results of each step are uniquely defined.
5. Finiteness \rightarrow The algorithm applies to a set of after finite number.
6. Independent \rightarrow The algorithm applies to a set to inputs.

(b) Disadvantage of Algorithm:-

- 1. Algorithms is time consuming.
- 2. Difficult to show Branching and Looping in Algorithms
- 3. Big tasks are difficult to put in Algorithms.

Advantage of Algorithms:

- 1. It is a step-wise representation of a solution to a given problem, which makes it easy to understand.
- 2. An algorithm used a definite procedure.
- 3. It is not dependent on any programming language, so it is easy to understand for anyone even without any programming knowledge.
- 4. Every step in an algorithm has its own logical sequence. so it is easy to debug.
- 5. By using algorithms the problem is broken down into smaller pieces or steps hence, it is easier for programmer to convert it into an actual program.

(c) Types of Algorithm:

Here is 7 type of algorithm :-

1. Brute force algorithm.
2. Recursive Algorithm.
3. Dynamic Programming Algorithm.
4. Divide and Conquer algorithm.
5. Greedy algorithm.
6. Backtracking Algorithm.
7. Randomized algorithm.

Greedy Algorithm: A Greedy algorithm is an approach for solving a problem by selecting the best option available at the moment. It doesn't worry whether the current best result will bring the overall optimal result. The algorithm never reverses the earlier decision even if the choice is wrong. It works in a top-down approach.

There are few variations of the greedy algorithm:-

- Pure greedy algorithm.
- Orthogonal greedy algorithm.
- Relaxed greedy algorithm.

(a) Searching Algorithm: In Computer Science, search algorithm is an algorithm designed to solve a search problem. Search algorithm works to retrieve information stored within particular data structure or calculated in the search space of a problem domain, with either discrete or continuous values.

Sorting Algorithm: In Computer Science, a sorting algorithm is an algorithm that puts elements of a list into an order. The most frequently used orders are numerical order and lexicographical order, and either ascending or descending.

(b) Huffman Coding: Huffman Coding is a method of data compression that is independent of the data type, that is, the data could represent an image, audio or spreadsheet. This compression scheme is used in JPEG and MPEG-2. Huffman Coding works by looking at the data stream that makes up the file to be compressed.

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In Computer science and information theory a Huffman Code is a particular type of optimal prefix code that is commonly used for lossless data compression.

c) Mathematical Algorithm:- An algorithm in math is a procedure a description of a set of steps that can be used to solve a mathematical computation. For example, a step-by step procedure used in long divisions is a common example of a mathematical algorithm.

Graph Algorithm: Graph algorithms are a set of instructions that traverse graph, some algorithms are used to find a specific node or the path between two given nodes.