

4. ALGORITHMIC STRATEGIES

Learning Objectives

At the end of this chapter the students will be able to:

- Know the basics and technical perspective of algorithms.
- Understand the efficiency, time and space complexity of an algorithm.
- Develop and analyze algorithms for searching and sorting.
- Learn about dynamic programming through algorithmic approach

Important Notes and Points

- ❖ The word Algorithm comes from the name of a Persian author, Abu Jafar Mohammed ibn Musa al Khowarizmi(c. 825 AD(CE)), who wrote a textbook on mathematics. The word Algorithm has come to refer to a method to solve a problem.
- ❖ Search → To search an item in a data structure using linear and binary search.
- ❖ Sort → To sort items in a certain order using the methods such as bubble sort, insertion sort, selection sort, etc.
- ❖ Insert → To insert an item (s) in a data structure.
- ❖ Update → To update an existing item (s) in a data structure.
- ❖ Delete → To delete an existing item (s) in a data structure.

- ❖ An algorithm that yields expected output for a valid input is called an algorithmic solution.
- ❖ An estimation of the time and space complexities of an algorithm for varying input sizes is called algorithm analysis.
- ❖ The best algorithm to solve a given problem is one that requires less space in memory and takes less time to execute its instructions to generate output.
- ❖ A way of designing algorithm is called algorithmic strategy
- ❖ Memoization or memoisation is an optimization technique used primarily to speed up computer programs by storing the results of expensive function calls and returning the cached result when the same inputs occur again.

Algorithm	Program
Algorithm helps to solve a given problem logically and it can be contrasted with the program	Program is an expression of algorithm in a programming language
Algorithm can be categorized based on their implementation methods, design techniques etc	Algorithm can be implemented by structured or object oriented programming approach
There is no specific rules for algorithm writing but some guidelines should be followed.	Program should be written for the selected language with specific syntax
Algorithm resembles a pseudo code which can be implemented in any language	Program is more specific to a programming language