



# INTRODUCTION TO SORTING

UNIT 3: SORTING & SEARCHING



# WHAT IS SORTING ?

- Sorting is the process of *arranging a collection of elements or data items* in a specific order.
- It is a fundamental operation in computer science and is used in various applications and algorithms.
- The goal of sorting is to rearrange the elements in a systematic way that allows for *efficient searching, accessing, and organizing* of the data.
- Sorting can be done in *ascending or descending order*, as per the requirements.
- Sorting is important because it enables efficient data retrieval, improves data analysis, and facilitates various operations such as searching, merging, and removing duplicates from a dataset.
- By arranging the elements in a specific order, sorting helps *optimize the performance of algorithms and data structures* that rely on sorted data.

# COMMON SORTING ALGORITHMS

There are numerous sorting algorithms available, each with its own characteristics, advantages, and disadvantages. Some commonly used sorting algorithms include:

- **Bubble Sort:**

Compares adjacent elements and swaps them if they are in the wrong order. It continues until the entire list is sorted.

- **Selection Sort:**

Finds the smallest (or largest) element and places it in the correct position, iteratively selecting the next smallest (or largest) element.

- **Insertion Sort:**

Builds a sorted portion of the list by inserting each element in its proper place within the sorted portion.



## ■ Merge Sort:

Divides the list into smaller sublists, recursively sorts them, and then merges them back together to create a sorted list.

## ■ Quick Sort:

Selects a pivot element, partitions the list into two sublists based on the pivot, and recursively sorts the sublists.

## ■ Heap Sort:

Builds a binary heap from the list and repeatedly extracts the maximum (or minimum) element to form a sorted list.

The choice of sorting algorithm depends on factors such as

1. size of the data,
2. desired time complexity,
3. stability of the algorithm,
4. any specific requirements of the problem at hand.

Download Lecture Slides & Executable Programs from  
<https://github.com/ashiqirphan-AI/AD3251-DSD-Programs>

