

## Important problem types :-

- Sorting
- Searching
- String processing
- graph problems
- Combinatorial problems
- Geometric problems
- Numerical problems.

## Sorting :-

- Process in which an item rearranges the item either in ascending order.
- ex. for a student information system, we can either sort either by using reg-no or by their alphabets.
- That is called "key".
- No sorting algorithm is better in any situation.
- Two properties
  - Stable - Two data are same.
  - in place - does not require same memory.

## Searching

- It is the process of finding value called a "Search key".
- Searching can be either straight forward or binary search algorithm.
- Searching is vital in DB access.
- Some algorithms works faster, while complex
- Some are requires more memory.

## String processing.

- String is a sequence of characters.
- most common is text string, character string, numbers or special characters.
- Bit string has zero and one's.
- ↳ here most vital problem is "string matching".  
Ex: Brute force string matching.

## Graph problems:

- Graph is a collection of points called "vertices" which are connected by edges.
- ↳ They are used in transportation and in the communication networks.
- This includes graph traversals, shortest path and topological sorting algorithms.

### Two common issues:-

- Traveling salesman issue - finding shortest tour by every visit to city.
- Graph colouring issue - to assign colours to all the vertices without making same colours to nearest vertices.  
↳ This can be done in event scheduling.

## Combinatorial problems

- Finding combination and permutations  
↳ maximizes the value, minimizing the cost.
- when problem size increases, combinatorial object combination and permutation gets increases.
- There is no known algorithm which solves the issues in considerable amount of time.

## Geometric problems :-

- deals with the geometric objects with lines, object, points and polygons.
- convex hull problem, closest problem pair.

## Numerical problems :-

- algorithms for scientific and engineering problems.
  - ↳ only approximate solutions are possible.
  - ↳ solving linear equations, algebraic equations.