* Basic Analysis on Algorithm :-

Analysis of algorithms is the determination of the amount of time and space resources to execute it.

The analysis of algorethm is to compare the various algoruthms to solve a same problem.
This is done to analyse which algoruthm takes less resources such as time, effort and memory to solve a particular problem.
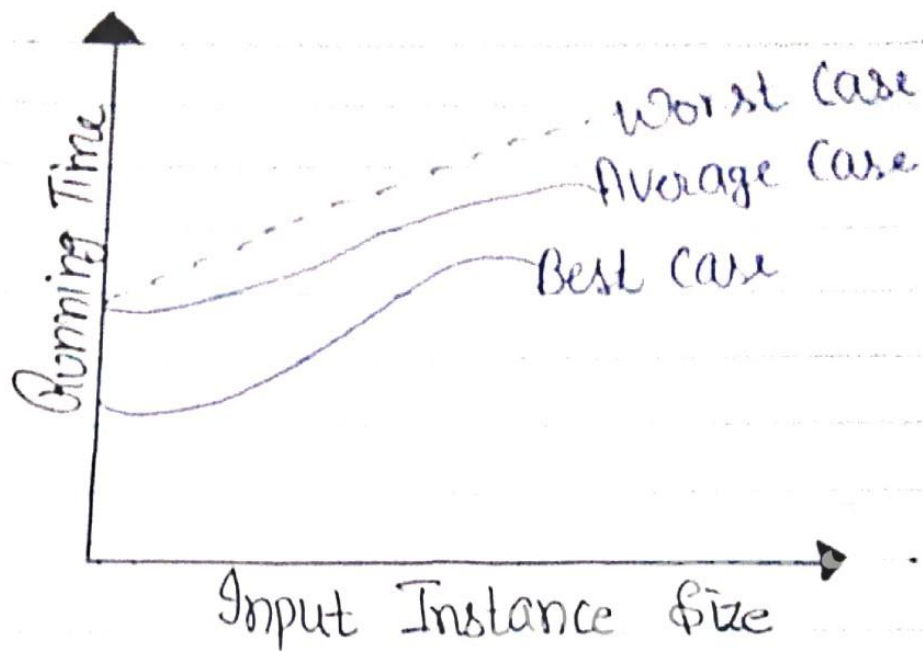
Types of analysis of algorethm :-

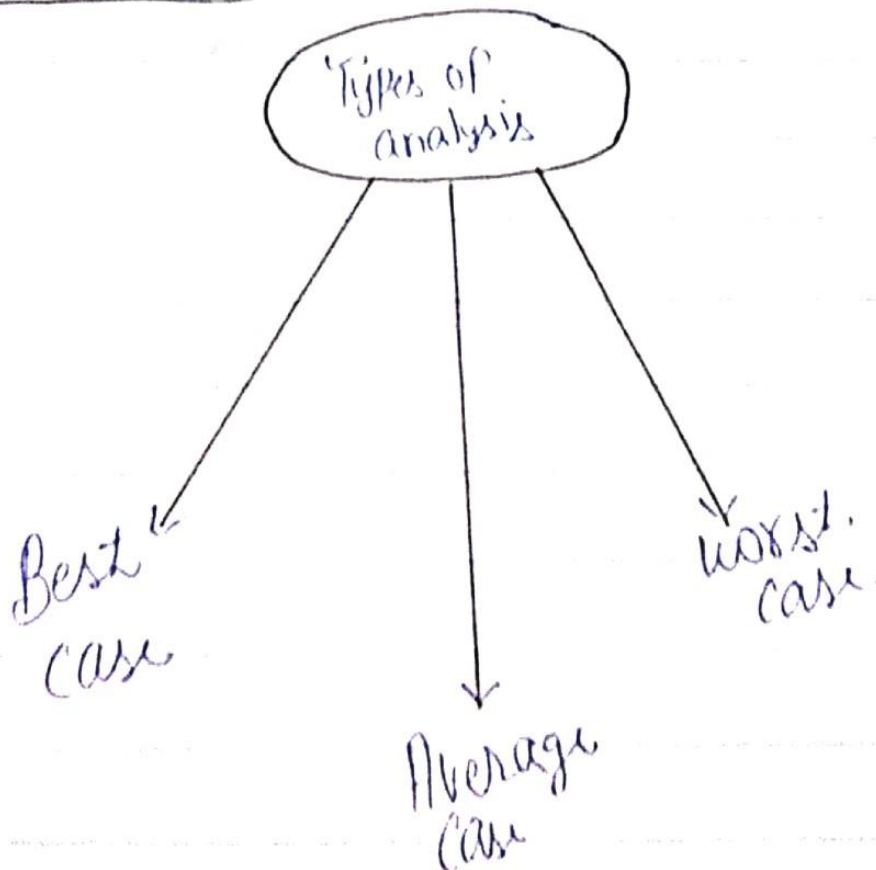1. Best case

2. Worst Case

3. Average Case.

To analyze a particular algorethm, we need to understand for which input the algo takes less time or which I/p takes more

Graph on types of Analysis :-

Three cases:

1. **Best case :-** It is the shortest running time of an algorithm. It takes less time.

- It uses the less resources.

- It takes minimum number of steps required to reach the result.

2. **Worst case :-** Where we assume the input, for which algorithm takes long time.

- It is the longest running time of an algorithm.

- It takes maximum number of steps.

3. **Average Case :-** Where the input lies in between best and worst case.

- It is oftenly very useful but more difficult to compute.

* Calculate Average Case Complexity :-

It is calculated by first multiplying the number of steps performed in each case by its probability of occurrence and then adding all the terms.

$x_1, x_2, x_3 \ldots x_k$ number of operations.
$p_1, p_2, \ldots p_k$ is probability

$$x_{AVG} = x_1 p_1 + x_2 p_2 + \ldots + x_k p_k$$

$$x_{AVG} = \sum_{i=1}^{k} x_i p_i$$

example:

8	6	12	5	9	7	4	3	16	15	(Linear Search)
0	1	2	3	4	5	6	7	8	9	

Best Case :- Search key element present at first index. [Best case-time = Constant]

Worst Case :- Search key element at last index. [worst case time = n]

Average Case :- Search a middle or average no.

$$\boxed{\frac{n(n+1)2}{n}}$$

$$A(n) = \frac{n+1}{2}$$