Classification of Randomized Algorithm.

Randomized algorithms are classified into two categories:-

1. Las Vegas 2. Monte Carlo.

1. Las Vegas: → These algorithms always produce correct and optimum results.

→ The time complexity of these algorithms is based on a random value and time complexity is evaluated as expected value.

→ for example:

Randomized Quicksort. always sort an input array and expected worst case time complexity is $O(n \lg n)$.

2. Monte Carlo: → Produce correct or optimum result with some probabilities.

→ These algorithms have deterministic running time and it's generally easier to find out worst case time complexity.

→ for example:

Fermet Method for Primality Test.

Fermet Method

If n is a prime no. then for every a, $1 < a \leq n-1$

$a^{n-1} \equiv 1 \pmod{n}$ or $a^{n-1} \% n = 1$.

Example for understanding Classification

Q. Consider a binary array where exactly half elements are 0 and half are 1. The task is find index of any 1.

A Las Vegas algorithm for this task is to keep picking a random element until we find a 1.

A Monte Carlo algorithm for the same is keep picking a random element until we either find 1 or we have tried maximum allowed times say k.