SNS COLLEGE OF ENGINEERING

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Department of Artificial Intelligence and Data Science

Course Name: 23ITB201 Data structures and Algorithms

II Year / III semester

Unit I – List ADT

Topic: Recursive and non recursive Algorithms

Recursion and Non recursion

Recursion

What is Recursion?

Recursion is a programming technique where a function calls **itself within its own definition**. This allows a function to **break down a problem into smaller subproblems**, which are then solved recursively.

What is a Recursive Algorithm?

A recursive algorithm is an algorithm that uses recursion to solve a problem. Recursive algorithms typically have two parts:

1. **Base case:** Which is a condition that stops the recursion.
2. **Recursive case:** Which is a call to the function itself with a smaller version of the problem.

Examples of Recursion

Examples of recursion:

- Example 1: Factorial: The factorial of a number n is the product of all the integers from 1 to n. The factorial of n can be defined recursively as:

factorial(n) = n * factorial(n-1)

- Example 2: Fibonacci sequence: The Fibonacci sequence is a sequence of numbers where each number is the sum of the two preceding numbers.
- The Fibonacci sequence can be defined recursively as:

fib(n) = fib(n-1) + fib(n-2)

Non Recursive Algorithm

- Non Recursive Algorithm, also known as an iterative algorithm, involves solving a problem through repetition of a series of instructions until a specific condition is met, typically without the need for the function to call itself.
- Unlike recursive algorithms, non-recursive algorithms do not involve function calls to itself. Instead, they utilize looping structures such as for-loops, while-loops, and do-while loops, depending on the specific requirements of the problem and programming language.
- Each iteration repeats the same series of steps, manipulating the problem's input data until a solution is achieved.

Example Non Recursive Algorithm

Calculation of Factorial Number: .

- We make use of a loop to multiply the number with every other number smaller than it, until we reach the number 1.

```
int factorial(int num)
{
    int i=1,f=1;
        while(i<=num)
        {
            f=f*i;
            i++;
        }
return f;
}
```

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thank you