 

CM1602 : Data Structures and Algorithms for AI Tutorial 1

1. Briefly explain Data Structures, and the types of Data Structures. Find the uses of Data Structures.

Data Structures are organizations of data to solve problem at hand

Types of data Structures:

1)Static -: Fixed size, amount of memory allocated to them cannot change.

2)Dynamic-: Have flexible size, they can grow and shrink as needed to contain data to be stored.

Uses of data structures

1)Storing and retrieving large amounts of data

2)Improving performance of algorithms such as sorting and searching.

3)Managing and manipulating complex data.

1. Briefly explain Algorithms and why you should learn them.

Algorithms is a step by step procedure which defines a set of instructions to be executed in order to get the desired output.

We should learn algorithms as:

1)It gives an idea of the running time of solving an algorithm

2)Provide a systematic way to solve problems and can be applied to a wider range of problems.

3)Evaluate the efficiency of a solution. It measures the performance if different solutions and find the best one.

1. Implement a program to calculate the factorial of a given number using **Loops.**

import java.util.Scanner;  
  
public class Main {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.*in*);  
 System.*out*.print("Enter a number: ");  
 int number = scanner.nextInt();  
  
 int result = *factorial*(number);  
 System.*out*.println("The factorial of " + number + " is " + result);  
 }  
  
 public static int factorial(int n) {  
 int result = 1;  
 for (int i = 1; i <= n; i++) {  
 result = result \* i;  
 }  
 return result;  
 }  
}

1. Implement a program to calculate the factorial of a given number using **Recursion**

import java.util.Scanner;  
  
public class Main {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.*in*);  
 System.*out*.print("Enter a number: ");  
 int number = scanner.nextInt();  
  
 int result = *factorial*(number);  
 System.*out*.println("The factorial of " + number + " is " + result);  
 }  
  
 public static int factorial(int n) {  
 if (n == 0) {  
 return 1;  
 } else {  
 return n \* *factorial*(n-1);  
 }  
 }  
}

# Additional

1. What are Fibonacci numbers? Implement a program to calculate the Fibonacci value of a given number using **Loops**
2. Implement a program to calculate the Fibonacci value of a given number using

# Recursion

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8/14/2020 Module Code Module Name