

Unit-1

Termination: Alg is finite set of statements that ends its execution in a finite time & produces some o/p.

Introduction.  $\rightarrow$  Having infinite loop in an alg is an error

Notion of Algorithm:

- $\rightarrow$  The kind of error is logical error
- $\rightarrow$  Finite loops condition always evaluate to true
- $\rightarrow$  Decrement unit

An algorithm is a sequence of unambiguous instructions for solving a problem

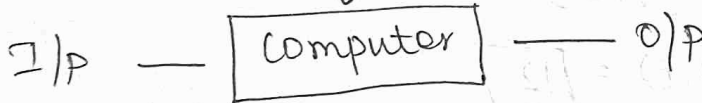
(i.e) for obtaining a required output for legitimating I/P for finite amount of data & time.

Characteristics of alg

Problem



Algorithm



1. Input
  2. Output
  3. Definiteness
  4. Finiteness
  5. Efficiency
  6. Unambiguity.
  7. Correctness.
  8. Termination.
  9. Performance
- ways to solve.  $\downarrow$

Ex:

GCD of two integers  $\rightarrow$

GCD can be denoted as  $\text{gcd}(m, n)$  because

Euclid's alg:

$$\text{gcd}(m, n) = \text{gcd}(m, m \bmod n)$$



Repeated until  $m \bmod n = 0$ .

as,  $\text{gcd}(m, 0) = m$ .

Step 1: If  $n=0$ , return the value of  $m$  as the answer & stop, otherwise proceed to Step 2.

Step 2: Divide  $m$  by  $n$  & assign the value of the remainder to  $r$ .

Step 3: Assign the value of  $n$  to  $m$  & the value of  $r$  to  $n$ . Go to step 1.

Step 4: Stop the program.

Compute GCD (60, 24)

$$M = 60; n = 24.$$

$$\frac{m}{n} = 2 \text{ (remainder 12)}$$

$$n = m = 24$$

$$r = n = 2.$$

$$\text{gcd}(m, n) = \text{gcd}(24, 2).$$

$$\frac{24}{2} = 2 \text{ (remainder 0)}$$

$$n = m = 12$$

$$r = n = 0.$$

$$\text{gcd}(12, 0) = \boxed{12}$$

$$\text{gcd}(60, 24) = 12 //$$

## Fundamentals of algorithm & problem solving.

The essence of this architecture is captured by RAM.

In this instruction executed by one after another. one operation at time

Understand the problem  
↓  
Decide on computational

means Exact Vs approximate  
Solving data structures.  
Algorithm design techniques.

↓  
Design an algorithm.

↓  
correctness

↓  
Analyze the alg

↓  
code the alg

→ Begin  
1/PB  
1/PB  
compute SMPB  
End.

Seq parallel.  
↓  
→ Seq Algorithm designed to be executed on such machine  
→ Alg that takes adv of this have capability are called parallel