INTRODUCTION TO ALGORITHMS

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Algorithm ???

Informally, an ***algorithm*** is any well-defined computational procedure that takes some value, or set of values, as ***input*** and produces some value, or set of values, as *Output*.

An algorithm is thus a sequence of computational steps that transform the input into the output.

We can also view an algorithm as a tool for solving a well-specified ***computational problem***.

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Algorithms can be easily understood by the analogy of Food Recipe.

"Any solvable computing problem can be solved by executing of a series of actions in a specific order. A procedure for solving a problem in terms of

1. The actions to execute

2. The order in which the actions execute

is called an algorithm."

LETS DISCUSS A SIMPLE EXAMPLE !!!

Problem Statement

Make a List of 100,000 integers and then ask user to input any integer and search that integer in your list. Also find the index of that integer.

Input : List of 100,000 integer

Output : Index Position of the found integer

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STEPS FOR MAKING ALGORITHMS

- First of all we have to ask user to input number which we have to search in our list/array. Let's call this number a **search entry**
- In order to find the search entry, we have to iterate our list/array
- In each iteration we have to use if statement in order to compare the elements of list/array with the search entry.
- If search entry will be found then break the loop and note down its position index.

Let's write a Pseudo Code in the next video by following the above procedure.

WHAT IS PSEUDO CODE ?

- WE USE PSEUDO CODE TO SHOW HOW WE SHALL SPECIFY OUR ALGORITHMS.
- WHAT SEPARATES PSEUDOCODE FROM "REAL" CODE IS THAT IN PSEUDOCODE, WE EMPLOY WHATEVER EXPRESSIVE METHOD IS MOST CLEAR AND CONCISE TO SPECIFY A GIVEN ALGORITHM.
- SOMETIMES, THE CLEAREST METHOD IS ENGLISH, SO DO NOT BE SURPRISED IF YOU COME ACROSS AN ENGLISH PHRASE OR SENTENCE EMBEDDED WITHIN A SECTION OF "REAL" CODE.
- ANOTHER DIFFERENCE BETWEEN PSEUDOCODE AND REAL CODE IS THAT PSEUDOCODE IS NOT TYPICALLY CONCERNED WITH ISSUES OF SOFTWARE ENGINEERING.
- ISSUES OF DATA ABSTRACTION, MODULARITY, AND ERROR HANDLING ARE OFTEN IGNORED IN ORDER TO CONVEY THE ESSENCE OF THE ALGORITHM MORE CONCISELY.

PSEUDO CODE

Let "A" be the list/array of 100,000 random integers and "S" be the search entry

- flag = false
- for i = 1 to A.length
  - if A[i] == S
    - flag = true
    - break

EFFICIENCY OF ALGORITHMS

- DIFFERENT ALGORITHMS DEVISED TO SOLVE THE SAME PROBLEM OFTEN DIFFER DRAMATICALLY IN THEIR EFFICIENCY. THESE DIFFERENCES CAN BE MUCH MORE SIGNIFICANT THAN DIFFERENCES DUE TO HARDWARE AND SOFTWARE.

EFFICIENCY IN TERMS OF RUNNING TIME