Algorithms & Data Structure

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Introduction

Algorithms and Data Structures (DSA) are one of the most fundamental coding concepts and knowing how they work will help you build a solid foundation in programming.
Learning algorithms will not only help you become a master programmer, but it will also prepare you crack the top tech companies. Plus, it will enable you to hone your **problem-solving** and **logical thinking skills** not only in programming, but also in everyday life.
If you think of DSA as a game and a mental workout, they will quickly become enjoyable activities for you, and once you start enjoying them, you will ace them.
Check this link to know: Why Learn Data Structure and Algorithms is important?

What is an Algorithm?

Algorithm is a procedure used for solving a problem or performing a computation. Algorithms act as an exact list of **instructions** that conduct specified actions step by step **to complete a specific task.** Algorithms can be expressed as natural languages, programming languages, pseudo code and flowcharts. They're the building blocks for programming, and they allow things like computers, smartphones, and websites to function and make decisions by telling **what** to do **and how** to do it.
A recipe is like an algorithm in that it's a number of steps (written on a box or included in a book) that achieve a specific task. For instance, you'd follow those steps to take a box mix and make a vanilla cake out of it.
Programming languages are normally used for expressing algorithms executed by a computer. They tell the computer exactly what to do in order to solve a specific problem or accomplish a task.
An example of algorithm used to find the summation of two numbers:

☞Let's have a look in this video: What is an Algorithm?

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Pseudocode

Pseudocode is a kind of structured English for describing algorithms. It allows the designer to focus on the logic of the algorithm without being distracted by details of language syntax. At the same time, the pseudocode needs to be complete. It describes the entire logic of the algorithm so that implementation becomes a rote mechanical task of translating line by line into source code. Pseudocode is an informal way of programming description that does not require any strict programming language syntax or underlying technology considerations. It is used for creating an outline or a rough draft of a program. Pseudocode summarizes a program's flow but excludes underlying details. System designers write pseudocode to ensure that programmers understand a software project's requirements and align code accordingly.

It is a simpler version of a programming code in plain English which uses short phrases to write code for a program before it is implemented in a specific programming language. In simple terms, it is a translation of algorithms in simple understandable plain English. It allows the designer to focus on the logic of the algorithm without being distracted by details of language syntax., **it is useful for** Describing how an algorithm should work, explaining a computing process to less-technical users.

Advantages of Pseudo code

1. In order to improve the readability of any approach, pseudocode plays a very important role.
2. In between the program and the algorithm, Pseudocode works as a bridge. It is treated as a document so that the developer can understand the program easily.
3. Pseudocode focuses on explaining the work of each line of the program. Due to this, it is very easy for the programmer to construct the code.

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Example: Calculate the class average for 3 students:

- Set total to zero.
- Set counter to one Input the first grade.
- Add the grade into the total Input the second grade.
- Add the grade into the total Input the third grade.
- Add the grade into the total.
- Set the average to the total divided by 3.
- Print the class average.

For further reading about Pseudo code: How to write a Pseudo Code? - GeeksforGeeks

What is Data Structure?

A data structure is a particular way of organizing and storing data in a computer so that it can be accessed and updated effectively.

For example, we can store a list of items having the same data-type using the array data structure.

Let us have a Look in this video Data Structures & Algorithms #1 - What Are Data Structures?

Types of Data Structure

Basically, data structures are divided into two categories:

- **Linear data structure**: the elements are arranged in sequence one after the other. Examples: array, linked list, stack and queue.
- **Non-linear data structure**: elements in non-linear data structures are not in any sequence. Instead they are arranged in a hierarchical manner where one element will be connected to one or more elements. Examples: graph and tree data structure.

****We will learn about each type in detail during the boot-camp.**

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Coding Dojo Algorithm App

The algorithm app is a tool developed by Coding Dojo to learn algorithms, for loops, if/else statements, array manipulation, and more.

Kindly create an account using **the same email you have used for the application** to later sync up your progress on the Coding Dojo platform, Try to finish all the tasks in the app before the beginning of the cohort.

TIP: YOU DON'T HAVE TO HAVE A PERFECT SOLUTION TO BEGIN WITH. As you work through the problem, you can change and update and grow.

You can access the app through the following link: Your Guide to Learn Programming Algorithms | Coding Dojo

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