Programming is the art of telling the computer what to do using some set of laid down rules and principles to make digital applications e.g Softwares, Apps, Websites, and Operating systems. The argument of whether Programming is an Art or Science will be a topic to be discussed another day but for now, let's just call it an Art since Programmers write code.

We are aware that there are various styles of writing programs. The kind of problem you're solving will determine which style you are to use. These styles are also sometimes called Paradigms. In case you're not clear what these styles are, they're:

* Object-oriented
* Functional
* Logical
* Imperative

These Paradigms offer us different abilities.

* The Object-oriented Paradigm offers us the ability to have objects which we can give methods and properties peculiar to only that object.
* The Functional Paradigm allows us to write programs in form of mathematical equations or functions.
* The Logical Paradigm allows us to write programs that draw conclusions or deduce results from given values through comparisons.
* The Imperative Paradigm allows us to write programs in a step by step sequence and have the program change some of its values while working.

All these Paradigms are all borrowed from Mathematics. Let's see some of the Significance of Mathematics on Programming/Development.

* Mathematics teaches the usage of algorithms which helps to develop logical thinking.
* Analytical thinking which is the way of breaking down problems from unknown to known can be quickly gotten through mathematics.

Let's take some deep dive. So, What is an Algorithm? An Algorithm is a process or set of rules to be followed in a calculation or other problem - solving operations, especially by a computer. Solving maths problems relating to algebra requires you to use the algebraic process, and that in itself teaches the usage of algorithms.

Solving maths problems bends your mind to think critically and analytically at the same time and this helps in developing your mind to think logically.

Analytical thinking is studying a particular problem to develop more ideas about it or probably find a solution to the problem by breaking it down to the smallest pieces of information known about the problem. This is called the First Principle. Analytical thinking can help you investigate problems and find solutions to them. Analytical thinking requires the following steps:

* Identifying the problem.
* Give detailed information about the problem.
* Provide a solution to the problem using the known information about the problem.

Looking at the steps listed above, let's relate them to how they're used in solving mathematical problems.Below are some of the uses of mathematics in various fields in computer science.

* Game development
* Artificial Intelligence
* Machine Learning
* Simulation
* Cryptography

GAME DEVELOPMENT

Games employ Maths for most of their functionalities. In big games like PUBG, EVE online, and even little games like Pong and Pacman games. Mathematics is needed for the actions and movements of smart enemies which game characters will perform at their required time and, also to determine the angles at which characters will move geometrically and trigonometrically. Mathematical topics employed in Game Development are:

* Algebra.
* Trigonometry.
* Geometry.
* Calculus.

In advanced fields of programming like AI and ML, Mathematics is essentially needed. A very extensible part of Mathematics found in AI and ML is STATISTICS. Data is the basis of AI and ML and how that data is analyzed and consumed is Statistics. Other topics that are also used in AI and ML are:

* Algebra
* Calculus

SIMULATION & CRYPTOGRAPHY.

Random Numbers are used for simulation, cryptography, and some other areas. The way these random numbers are generated is purely mathematical. These random numbers are used in Data Encryption. The popular topics used in the field of Simulation and Cryptography are:

* Number Theory
* Calculus

In conclusion, Mathematics is the underlying foundation of Programming. For you to build a solid career, you should have a solid foundation in mathematics. Although people say mathematics is not required to start learning Programming, that is true. But for you to do the extraordinary with your Programming skills, you have to learn Maths. The Question of whether Mathematics is required for you to start Programming depends on the kind of problems you're trying to solve.

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