

Lambda Calculus Introduction

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Lambda Calculus

Lambda Calculus also known as λ -**Calculus** is a model of computation developed by *Alonzo Church* in the 1930s.

One of the important things it deals with is :-

The way we usually define functions is *Extrinsional*, as in, a function is uniquely defined by the relation it creates between its inputs and outputs, while this way to identify a function is good for most of mathematics, it is important to define the exact way in which a function computes. This problem is solved by lambda calculus making it an *Intrinsional* Syntax for function definition.

It captures an *intrinsional* definition of a function in its very minimal **syntax** and simple **evaluation rules**.

The interesting thing about **lambda calculus** is that, in the world of lambda calculus, there are **ONLY** functions, no values, no constants.....

Then what do functions act on?

Other functions!!!

But even with this restrictions, this model of computation is **Turing Complete**, as in its a **Universal Computation Model**

This was done by finding a set of **computable functions** by λ -calculus which was later found to be the same as the set of functions computable by Turing Machines.

we can encode **Booleans** and **Natural Numbers** using lambda calculus.

It was used by *Alonzo Church* to solve the **Undecidability Problem** a year before *Alan Turing* did!!

References