GP - Person/Contribution Assignment

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Abstract: This assignment explores my person (Alonzo Church) as a person and his contribution to formal systems and computer science.

ALONZO CHURCH

“The only thing that might have annoyed some mathematicians was the presumption of assuming that maybe the axiom of choice would fail, and that we should look into contrary assumptions.”

Early Life and Education

Alonzo Church was borned on June 14, 1903, in Washington, D.C., where his father was a judge but later lost the position because of failing eyesight. His uncle, also named Alonzo Church, helped him attend school in Connecticut, and later Church attended Princeton University and graduated with a degree in mathematics. He continued his studies at Princeton earning his Ph.D. in mathematics in three years under Oswald Veblen. In 1941, Church wrote the monograph known as *The Calculi of Lambda-conversion,* which became useful in the development of semantics for programming languages, and today it is a major research topic in theoretical computer science.

Accomplishments and Contributions

Church's contribution to the Entscheidungsproblem (German for "decision problem") was the Church's theorem. Church's theorem was a negative answer to the Entscheidungsproblem, where he formally defined that notion of "algorithm" with the concept of "effective calculability" based on his work of lambda calculus. Church proposed that, "we define the notion … of an effectively calculable function of positive integers by identifying it with the notion of a recursive function of positive integer", where the concept of recursive function is due to Kurt Godel, and Jacques Herbrand. The result was that the class of lambda-definable functions and the class of recursive functions, both of positive integers, are identical, which was proved by Church and Kleene (Stanford Encyclopedia of Philosophy). Another important contribution was the Church-Turing Thesis, which can be stated as "The assumption that the intuitive notion of computable functions can be identified with partial recursive functions."

Lambda calculus

A formal system created by Church was the lambda calculus, which became an important tool in computer science, and this system is able to define the notion of computable functions. Stanford Encyclopedia of Philosophy states, “a function is said to be lambda-definable if the values of the function can be obtained by a certain process of repeated substitution”. According to wikipedia, “Lambda calculus is a formal system in mathematical logic for expressing computation based on function abstraction and application using variable binding and substitution.” Along with that, it is also an universal model of computation that can be used to simulate any Turing machine. The lambda calculus also influenced the design of the LISP programming language and functional programming languages in general.

References:

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