An official website of the United States Government.

PUBLIC SUBMISSION

Comments submitted by Robert Crockett

Posted by the **Patent and Trademark Office** on Oct 17, 2021

View More Comments 83 (/document/PTO-P-2021-0032-0004/comment)

View Related Comments 145 (/docket/PTO-P-2021-0032/comments)

Share

Comment

"Computers are logic in action."
So say Professors Page and Gamboa in their book "Essential Logic for Computer Science," at page xiii [The MIT Press, 2018].
Harry R. Lewis, Gordon McKay Research Professor of Computer Science at Harvard University states that "Computer science is the child of logic, the mathematical sciences, and the human imagination." [Ideas that created the future : classic papers of computer science, The MIT Press, 2021, page xv].

A computer program is an completely abstract expression of mathematical logic, indistinguishable from a theorem in the lambda calculus. Consequently, no computer program is patentable subject matter under the Supreme Court's Alice decision, notwithstanding the numerous illogical opinions of certain CAFC panels to the contrary since the Alice decision was handed down.

'The evolution of computer science from mathematical logic culminated in the 1930s, with two landmark papers: Claude Shannon's "A Symbolic Analysis of Switching and Relay Circuits," and Alan Turing's "On Computable Numbers, With an Application to the Entscheidungsproblem." In the history of computer science, Shannon and Turing are towering figures, but the importance of the philosophers and logicians who preceded them is frequently overlooked.

Shannon's insight was that George Boole's logical system could be mapped directly onto electrical circuits. He showed the correspondence between electrical circuits and Boolean operations and was first to distinguish between the logical and the physical layer of computers.

Turing showed how to design computers in the language of mathematical logic. When Turing wrote his paper, in 1936, he was trying to solve "the decision problem," first identified by the mathematician David Hilbert, who asked whether there was an algorithm that could determine whether an arbitrary mathematical statement is true or false.

In 1879, when the German philosopher Gottlob Frege published his landmark logic treatise Begriffsschrift. Frege developed a much more advanced logical system than Boole's. The major innovation is that it much more accurately represented the logical structure of ordinary language. Frege was the first to use quantifiers and to separate objects from predicates. He was also the first to develop what today are fundamental concepts in computer science like recursive functions and variables with scope and binding. Frege's formal language is made up of meaningless symbols that are manipulated by well-defined rules. The language is only given meaning by an interpretation, which is specified separately. This turned logic into what the eminent computer scientists Allan Newell and Herbert Simon called "the symbol game," "played with meaningless tokens according to certain purely syntactic rules."

In 1931, Gödel published his incompleteness theorem, and Turing and Alonzo Church independently proved that no algorithm could exist that determined whether an arbitrary mathematical statement was true or false. (Church did this by inventing an entirely different system called the lambda calculus, which would later inspire computer languages like Lisp.) The answer to the decision problem was negative.

Turing's key insight came in the first section of his famous 1936 paper, "On Computable Numbers, With an Application to the Entscheidungsproblem." In order to rigorously formulate the decision problem (the "Entscheidungsproblem"), Turing first created a mathematical model of what it means to be a computer (today, machines that fit this model are known as "universal Turing machines"). As the logician Martin Davis describes it: Turing knew that an algorithm is typically specified by a list of rules that a person can follow in a precise mechanical manner, like a recipe in a cookbook. By proving that no machine performing only those basic actions could determine whether or not a given proposed conclusion follows from given premises using Frege's rules, he was able to conclude that no algorithm for the Entscheidungsproblem exists. As a byproduct, he found a mathematical model of an all-purpose computing machine. Next, Turing showed how a program could be stored inside a computer alongside the data upon which it operates. In today's vocabulary, we'd say that he invented the "stored-program" architecture that underlies most modern computers.'
[The Atlantic, "How Aristotle Created the Computer" by Chris Dixon, March 20, 2017]

I attach addition sources supporting my position that no computer program is patentable subject matter because all computer programs reduce to mathematical logic.

Respectfully,
Robert G. Crockett
Reg. No. 42448

Attachments 9

On the Unusual Effectiveness of Logic in Computer Science

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_1.pdf)

LogicInCS

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_2.pdf)

What_is_a_Computer-a Survey

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_3.pdf)

Mathematical_logic_for_computer_science_2_ed

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_4.pdf)

A Concise IntroductiontoMathematical Logic

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_5.pdf)

CONSTRUCTIVE _MATHEMATICS_ AND_ COMPUTER_PROGRAMMING

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_6.pdf)

An_Axiomatic_ Basis _for_Computer_Programming

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_7.pdf)

When Logic Meets Engineering Introduction to Logical Issues in the History and Philosophy of Computer Science

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_8.pdf)

What_Is_An_Algorithm

Download (https://downloads.regulations.gov/PTO-P-2021-0032-0138/attachment_9.pdf)

Comment ID

PTO-P-2021-0032-0138

Tracking Number

kut-2to9-hkfd

Comment Details | Submitter Info

Document Subtype

Comment(s)

Received Date

Oct 14, 2021

Page Count

1

Your Voice in Federal Decision Making

About (/about) Agencies (/agencies) Learn (/learn)
Reports (https://resources.regulations.gov/public/component/main?main=Reports) FAQ (/faq)

Privacy & Security Notice (/privacy-notice) | User Notice (/user-notice) |
Accessibility Statement (/accessibility) | Developers (https://open.gsa.gov/api/regulationsgov/)

Support (/support) Provide Site Feedback