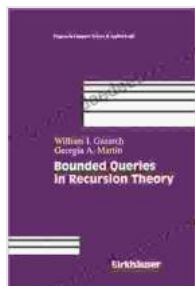


Bounded Queries In Recursion Theory: Progress In Computer Science And Applied



Bounded Queries in Recursion Theory (Progress in Computer Science and Applied Logic Book 16)

by Dante Alighieri

★★★★★ 5 out of 5

Language : English

File size : 4296 KB

Text-to-Speech: Enabled

Print length : 372 pages

Screen Reader: Supported



Bounded queries are a powerful tool in recursion theory, and have been used to solve a wide variety of problems. In this article, we will discuss the progress that has been made in the study of bounded queries, and some of the applications of this work to computer science and applied mathematics.

Definition of Bounded Queries

A bounded query is a function that takes as input a natural number and returns a finite set of natural numbers. The size of a bounded query is the maximum number of elements in its range. For example, the function that takes as input a natural number and returns the set of all its prime factors is a bounded query of size 1.

Progress in the Study of Bounded Queries

The study of bounded queries has a long history, dating back to the work of Turing and Post in the 1930s. In the 1960s, Shepherdson and Sturgis showed that the set of all bounded queries is recursively enumerable. This result was later strengthened by Buchi, who showed that the set of all bounded queries is in fact arithmetical.

In the 1970s, Meyer and Fischer independently showed that the set of all bounded queries is not recursive. This result was a major breakthrough, as it showed that there is a fundamental limitation to the power of bounded queries.

In the 1980s, there was a great deal of interest in the study of bounded queries in the context of computational complexity theory. This work led to the development of new techniques for proving lower bounds on the computational complexity of problems. In the 1990s, there was a renewed interest in the study of bounded queries in the context of recursion theory. This work led to the development of new techniques for proving upper bounds on the computational complexity of problems.

Applications of Bounded Queries

Bounded queries have a wide variety of applications in computer science and applied mathematics. Some of the most important applications include:

- **Database theory:** Bounded queries can be used to design efficient algorithms for answering queries on databases. For example, the algorithm for finding all the prime factors of a number can be used to design an efficient algorithm for answering the query "What are the prime factors of this number?"

- **Computational complexity theory:** Bounded queries can be used to prove lower bounds on the computational complexity of problems. For example, the fact that the set of all bounded queries is not recursive can be used to prove that the halting problem is not solvable in polynomial time.
- **Recursion theory:** Bounded queries can be used to study the structure of the set of all recursive functions. For example, the fact that the set of all bounded queries is arithmetical can be used to prove that the set of all recursive functions is not recursive.

Bounded queries are a powerful tool in recursion theory, and have been used to solve a wide variety of problems. The study of bounded queries has a long history, and has led to a number of important results. Bounded queries have also been used to develop a number of important applications in computer science and applied mathematics.



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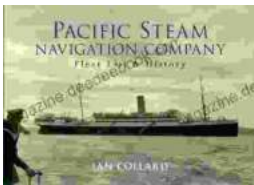
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