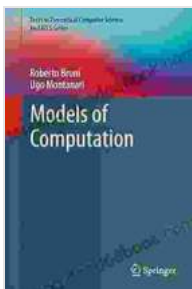


# Models of Computation Texts in Theoretical Computer Science: An EATCS Series

Models of computation are formal frameworks that describe the capabilities and limitations of different computing devices. They are essential tools for understanding the foundations of computer science and for designing new computational systems.

This article provides an overview of some of the most important models of computation, as well as a discussion of their applications in theoretical computer science.

There are many different types of models of computation, each with its own strengths and weaknesses. Some of the most common types of models include:



## Models of Computation (Texts in Theoretical Computer Science. An EATCS Series) by K. M. Frost

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- **Finite automata** are simple models of computation that can be used to recognize regular languages.
- **Pushdown automata** are more powerful than finite automata and can be used to recognize context-free languages.
- **Turing machines** are the most powerful type of model of computation and can be used to recognize any language that can be defined by a grammar.
- **Random access machines** are a type of Turing machine that can access memory in a constant amount of time.
- **Cellular automata** are models of computation that consist of a grid of cells, each of which can be in one of a finite number of states.

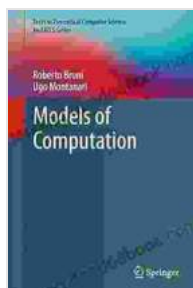
Models of computation have a wide range of applications in theoretical computer science, including:

- **Complexity theory** is the study of the computational complexity of different problems. Models of computation are used to define the complexity classes that are used to classify problems.
- **Computability theory** is the study of what problems can and cannot be solved by computers. Models of computation are used to prove that certain problems are undecidable.
- **Formal language theory** is the study of formal languages and their properties. Models of computation are used to define formal languages and to study their closure properties.
- **Artificial intelligence** is the study of how to create computers that can think and learn. Models of computation are used to design algorithms

for solving AI problems.

Models of computation are essential tools for understanding the foundations of computer science and for designing new computational systems. This article has provided an overview of some of the most important models of computation, as well as a discussion of their applications in theoretical computer science.

- [1] Michael Sipser, *Introduction to the Theory of Computation*, 3rd ed. (Boston: Cengage Learning, 2012).
- [2] Christos Papadimitriou, *Computational Complexity*, 1st ed. (New York: Addison-Wesley, 1994).
- [3] John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, 3rd ed. (Boston: Addison-Wesley, 2006).



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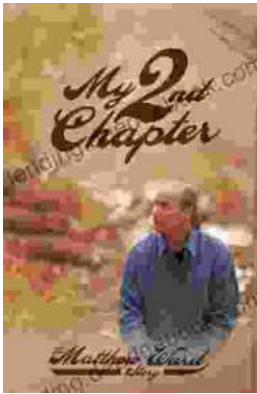
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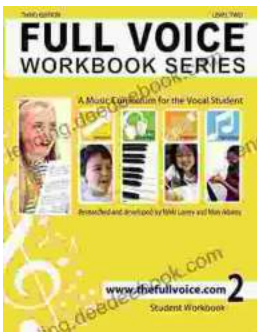
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