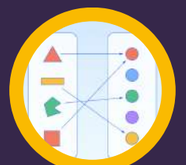
DOMAINS

AUTOMATA THEORY

Study of abstract machines and their computational abilities

FORMAL LANGUAGES

Study of languages and their properties, and the relations between different types of languages



COMPUTABILITY THEORY

Study of the limits of computation and the types of problems that can be solved algorithmically

COMPLEXITY THEOR

Study of the resources (time, space, etc.) required to solve computational problems

CRYPTOGRAPHY

study of techniques for secure communication and data protection

ALGORITHMIC GAME THEORY

Study of the mathematical models of strategic interaction between rational agents

QUANTUM COMPUTATION

Study of computation based on quantum mechanics and quantum circuits

REVOLUTIONARY BREAKTHROUGHS

- **Quantum Computing:** One of the most exciting breakthroughs in the field of computation is quantum computing. These computers use the principles of quantum mechanics to perform computations much faster than classical computers.
- **Algorithmic Fairness:** As algorithms play an increasingly important role in our lives, ensuring that they are fair and unbiased towards different groups of people has become a pressing issue.
- **Formal Verification:** Another breakthrough in Theory of Computation is formal verification, which involves using mathematical techniques to ensure the correctness and safety of software and hardware systems.
- **Computational Biology:** Theory of Computation is increasingly being applied to the field of biology, leading to breakthroughs in areas such as drug discovery, personalized medicine, and genetic engineering.
- **Blockchain Technology:** Blockchain technology is another area where Theory of Computation has led to revolutionary breakthroughs.

DID YOU KNOW?

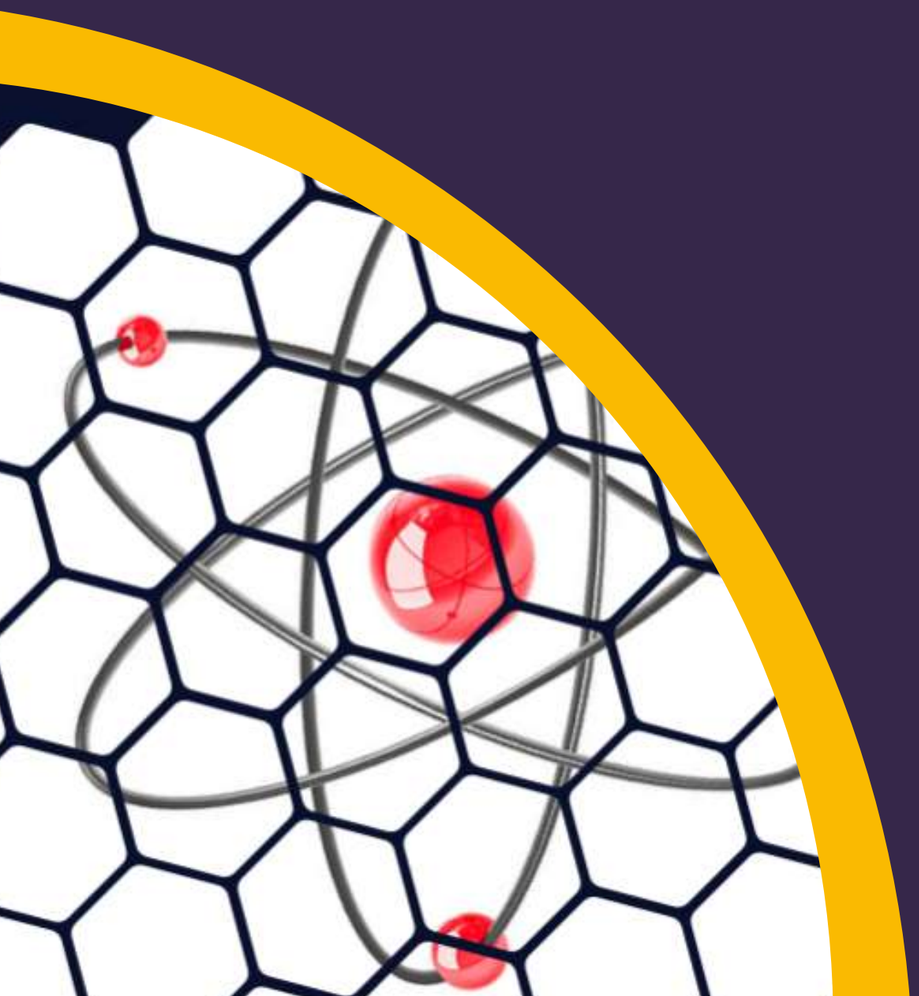
THE FASTEST KNOWN ALGORITHM FOR FACTORING LARGE NUMBERS IS BASED ON THE THEORY OF COMPUTATION?

- THIS ALGORITHM, KNOWN AS THE NUMBER FIELD SIEVE, IS USED IN CRYPTOGRAPHY TO BREAK CERTAIN TYPES OF ENCRYPTION.

THEORETICAL COMPUTER SCIENCE

Theory of Computation is a field of study in computer science and mathematics that deals with the study of computation, algorithms, and their properties.

Join us in the world of computation and explore the limitless possibilities with Theoretical Computer Science.



ONGOING MAJOR RESEARCH

- **Formal Languages:** Investigating formal language models for natural language processing, as well as exploring applications in DNA computing and molecular programming.
- **Computability Theory:** Exploring unconventional computing models such as quantum computing, DNA computing, and neural networks, and developing new models for solving currently intractable problems.
- **Complexity Theory:** Studying the complexity of algorithms, optimizing decision-making, and analyzing the efficiency of algorithms to determine what can and cannot be efficiently computed.
- **Cryptography:** Developing quantum-resistant cryptographic protocols and exploring the use of cryptography in applications like blockchain technology and secure multi-party computation.
- **Algorithmic Game Theory:** Developing algorithmic mechanisms for designing and analyzing economic systems, including auctions, mechanism design, and social choice, and exploring connections to other areas of computer science.
- **Quantum Computation:** Developing new quantum algorithms and computing architectures to solve complex problems, including chemistry simulation and machine learning.

FUTURE SCOPE

ADVANCEMENTS IN ARTIFICIAL INTELLIGENCE

Development of advanced AI algorithms and systems that can perform complex tasks and mimic human cognition

CYBERSECURITY

Ensuring the security and safety of digital systems and data against cyber-attacks and threats

BIOINFORMATICS

Application of computational techniques and algorithms in biological research and healthcare

CRYPTOCURRENCIES AND BLOCKCHAIN

Development of decentralised systems for secure and transparent transactions using blockchain technology