

Computational Mathematics and Its Applications

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Editorial

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INTRODUCTION

Computational mathematics leverages algorithms and numerical methods to solve real-world problems across sciences and engineering. With the rise of high-performance computing, computational techniques enable breakthroughs in simulation, data analysis, and algorithmic design. This article discusses five major research directions: numerical analysis, scientific computing, big data algorithms, cryptographic computation, and computer vision.

Advances in Computational Mathematics

Numerical Analysis: Numerical analysis ensures accuracy and stability in solving equations computationally. Finite difference and finite element methods remain central to engineering and physics problems [1].

Scientific Computing: Scientific computing integrates mathematics with computational hardware, enabling large-scale simulations in climate modeling, structural analysis, and plasma physics [2].

Algorithms for Big Data: Mathematical algorithms like matrix factorization and sparse optimization underpin big data analysis. Efficient computational strategies reduce complexity and improve scalability [3].

Cryptographic Computation: Computational number theory supports encryption techniques, ensuring secure transactions in banking and communication. Research now explores quantum-resistant algorithms [4].

Computer Vision: Mathematical models drive computer vision applications in image recognition, autonomous vehicles, and medical imaging. Linear algebra and optimization play vital roles in training deep learning models.

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