

# Computational Intelligence

in

Commerce, Mathematics,  
and Physical Sciences



$$\int_a^b f(x) dx$$

$$y = ax^2 + bx + c$$

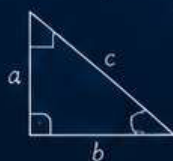
$$\sum_{i=1}^n x_i$$

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

$$\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\vec{\nabla} \cdot \vec{F} = 0$$

$$e^{in} + 1 = 0$$



*Editor*

**Dr. Priyanka**

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# Computational Intelligence in Commerce, Mathematics, and Physical Sciences

*Edited by:*

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## Preface

This edited volume presents a collection of peer-reviewed book chapters contributed by academicians, researchers, and industry professionals, exploring the convergence of computational intelligence with commerce, mathematics, and the physical sciences. The book addresses both theoretical foundations and applied innovations that are shaping contemporary research and practice across these disciplines.

The chapters cover a broad spectrum of topics, including machine learning, deep learning, natural language processing, generative artificial intelligence, edge computing, blockchain technology, cloud computing, cybersecurity, and big data analytics. Commerce-focused contributions examine AI-powered auditing, digital transformation, supply chain intelligence, and cryptocurrency. Mathematical contributions explore computational algebra, cryptography, optimization techniques, fuzzy logic, stochastic modelling, and tensor algebra. Chapters related to the physical sciences discuss quantum computing, artificial intelligence in electronics, climate modelling, and high-energy physics.

The volume also highlights interdisciplinary domains such as ethical AI, smart computing for sustainable development, human–computer interaction, and high-performance computing, reflecting the growing need for knowledge that transcends traditional disciplinary boundaries. These contributions demonstrate how computational intelligence is driving innovation and creating new opportunities for research and development across diverse fields.

This book is intended for academicians, researchers, postgraduate students, and industry professionals seeking insights into emerging technologies and their applications. It is hoped that the ideas and findings presented in this volume will encourage further research, foster interdisciplinary collaboration, and promote responsible innovation in the rapidly evolving landscape of computational intelligence.

## Acknowledgement

The publication of Computational Intelligence in Commerce, Mathematics, and Physical Sciences represents a collective scholarly endeavour. The editor expresses sincere appreciation to all contributors whose rigorous research and academic commitment form the intellectual foundation of this volume.

Special thanks to my family for their constant encouragement, support, and blessings throughout this journey. I express my heartfelt gratitude to my mother for her unconditional care, motivation, and sacrifices, and to my brothers for their continuous support, inspiration, and belief in me. Their love and encouragement have been a great source of strength and motivation during the completion of this work.

Heartfelt gratitude is extended to the Heads of Departments, institutional authorities, and academic collaborators for their encouragement and support throughout the publication process.

Special thanks are also extended to the team at Empyreal Publishing House for their guidance, professionalism, and commitment to quality publication standards. Appreciation is also due to all peer reviewers for their valuable suggestions and constructive feedback.

Finally, sincere thanks are offered to the readers and research community whose continued interest in computational intelligence motivates scholarly exploration and innovation.

Warm Regards,

**Dr. Priyanka**

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## ABOUT THE EDITOR



**Dr. Priyanka:** M.Sc., Ph.D. in Computer Science and Applications, UGC NET (3 Times), HTET (2 Times). She is currently working as an Assistant Professor in the Department of Information and Communication Technology at Ch. Bansilal University (CBLU), Bhiwani, Haryana. She has academic and research experience in the field of Computer Science and Information Technology, with expertise in Blockchain Technology, Cybersecurity, Artificial Intelligence, Internet of Things (IoT).

She has published numerous research papers in UGC Care, Scopus-indexed, and peer-reviewed journals, including publications in reputed international journals and conference proceedings. She has also contributed several book chapters and holds a published patent in the area of blockchain-based e-commerce security systems.

Dr. Priyanka has actively contributed to academic research, peer review, faculty development programmes, workshops, and international conferences. She has served as a reviewer for reputed journals including Springer Nature and Scopus-indexed journals. She is also serving as an Editorial Board Member of various reputed journals, including the International Journal for Development of Science and Technology (IJST).

In addition to her research and teaching contributions, she has coordinated various AICTE-associated national-level FDPs and workshops on Generative AI, Application Development with AI, MATLAB Programming, and emerging computing technologies. Her expertise lies in the areas of Blockchain Technology, Cybersecurity, Artificial Intelligence, IoT, Machine Learning, Research Methodology, and Advanced Computing Technologies.

## ABOUT THE BOOK

Computational Intelligence in Commerce, Mathematics, and Physical Sciences by Dr. Priyanka offers a comprehensive and interdisciplinary exploration of the transformative role of computational intelligence across diverse academic and scientific domains. The book examines how emerging technologies such as artificial intelligence, machine learning, blockchain, cloud computing, edge computing, big data analytics, and the Internet of Things are reshaping research, innovation, and practical applications in commerce, mathematics, and physical sciences.

The volume critically discusses contemporary developments and challenges associated with intelligent computing systems, including cybersecurity, data privacy, automation, optimization, computational modelling, and AI-driven decision-making. By integrating theoretical foundations with practical insights, the book highlights the growing significance of intelligent technologies in solving complex real-world problems and advancing interdisciplinary research.

Special attention is given to applications of computational intelligence in digital commerce, financial technologies, cryptography, mathematical modelling, sustainable computing, climate analysis, quantum computing, and scientific data processing. The book also explores ethical considerations, responsible AI deployment, and the importance of secure and sustainable technological innovation in modern society.

Designed for academicians, researchers, postgraduate students, industry professionals, this edited volume serves as an essential resource for understanding both the opportunities and challenges associated with computational intelligence and its expanding impact on multiple disciplines. Through structured analysis and scholarly contributions, the book provides readers with a holistic understanding of emerging intelligent technologies and their role in shaping the future of science, business, and society.



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