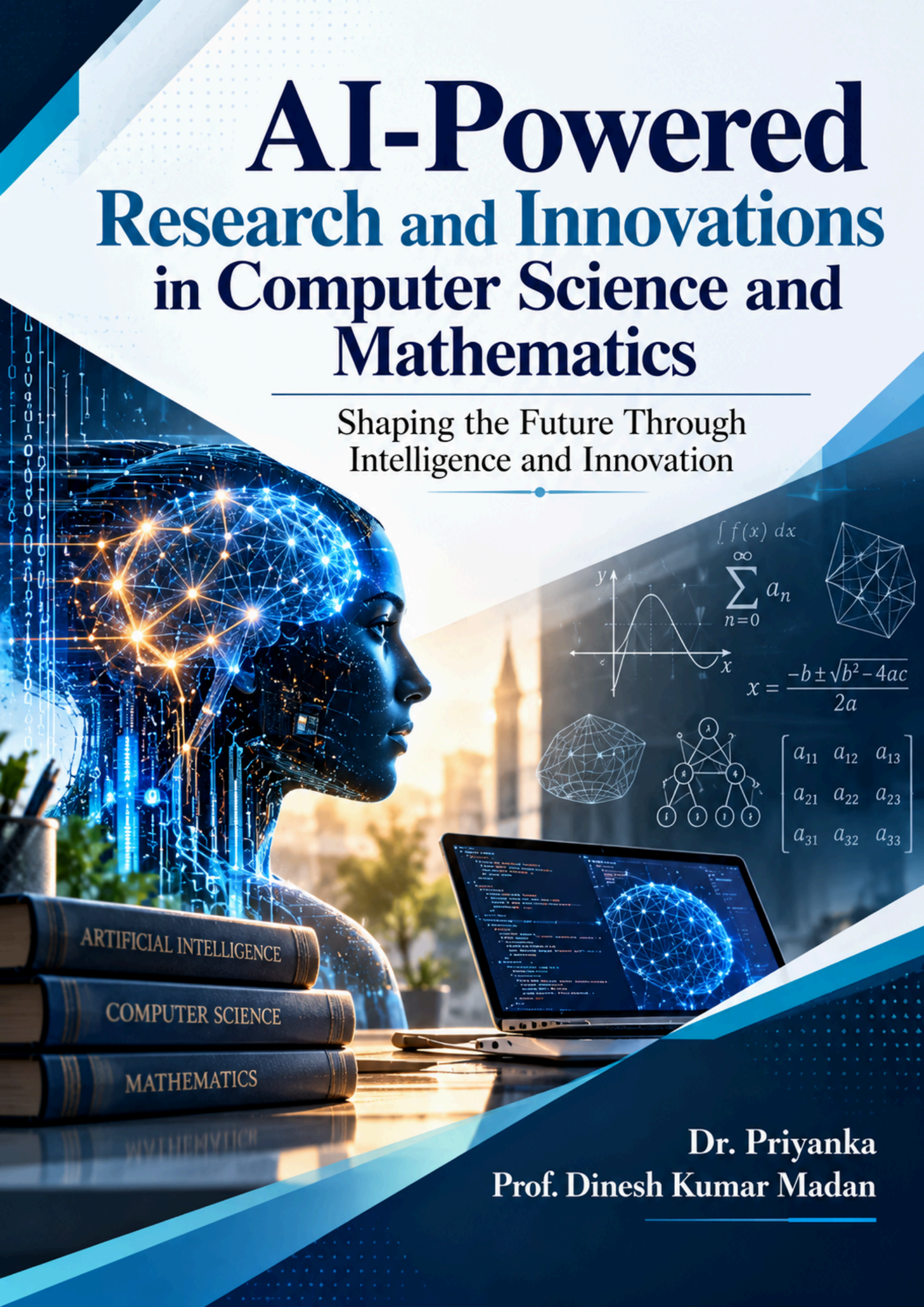
AI-Powered Research and Innovations in Computer Science and Mathematics

Shaping the Future Through Intelligence and Innovation



Dr. Priyanka
Prof. Dinesh Kumar Madan

AI-Powered Research and Innovations in Computer Science and Mathematics: Shaping the Future Through Intelligence and Innovation

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AI-Powered Research and Innovations in Computer Science and Mathematics: Shaping the Future Through Intelligence and Innovation

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Preface

The rapid advancement of Artificial Intelligence (AI) and emerging digital technologies has opened new horizons in research, innovation, and problem-solving across diverse disciplines. This edited volume, AI-Powered Research and Innovations in Computer Science and Mathematics: Shaping the Future Through Intelligence and Innovation, brings together scholarly contributions from academicians, researchers, scholars, and industry professionals to explore the integration of AI with Computer Science and Mathematics.

The volume covers a broad spectrum of contemporary topics, including AI algorithms and techniques, machine learning, deep learning, natural language processing, computer vision, data science, big data analytics, intelligent systems, robotics, cybersecurity, blockchain, cloud and edge computing, and the Internet of Things (IoT). Furthermore, the book highlights mathematical and computational approaches such as optimization techniques, differential equations, graph theory, game theory, stochastic processes, numerical analysis, simulation, and mathematical modeling, demonstrating their significance in advancing intelligent systems and data-driven research.

Special attention is given to emerging areas such as generative AI, large language models, reinforcement learning, explainable AI, quantum computing, ethical and responsible AI, and sustainable computing. By bringing together these interdisciplinary perspectives, the volume aims to encourage innovative thinking, promote collaboration between Computer Science and Mathematics, and address real-world challenges through intelligent and computational solutions. This book is intended to serve as a valuable resource for academicians, researchers, postgraduate students, and industry professionals interested in emerging technologies and interdisciplinary research. We hope that the contributions presented in this volume will inspire further investigation, foster meaningful academic collaboration, and support the development of innovative, efficient, and sustainable solutions for the future.

Editors
Dr. Priyanka
Prof. Dinesh Kumar Madan

Acknowledgement

The publication of this edited volume, *AI-Powered Research and Innovations in Computer Science and Mathematics: Shaping the Future Through Intelligence and Innovation*, is the result of collective scholarly efforts and academic collaboration. The editors express their sincere gratitude to all contributing authors for their valuable research contributions, innovative ideas, and commitment to advancing knowledge in Artificial Intelligence, Computer Science, and Mathematics.

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.

We extend our heartfelt appreciation to the peer reviewers for their constructive feedback, insightful suggestions, and valuable efforts in maintaining the academic quality of this volume. Their contributions have helped strengthen the quality and relevance of the chapters included in this book.

We are grateful to the academic colleagues, institutional authorities, and well-wishers whose encouragement and cooperation supported the completion of this publication. Special thanks are extended to the team at NEXGEN Publications for their guidance, professional assistance, and support throughout the publication process.

Finally, we express our sincere thanks to all readers, researchers, academicians, and students who engage with this volume. We hope that this book will inspire further research, promote collaboration between Artificial Intelligence, Computer Science, and Mathematics, and contribute meaningfully to future technological and scientific advancements.

Editors
Dr. Priyanka
Prof. Dinesh Kumar Madan

About The Book

AI-Powered Research and Innovations in Computer Science and Mathematics: Shaping the Future Through Intelligence and Innovation, edited by Dr. Priyanka and Prof. Dinesh Kumar Madan, presents a comprehensive collection of scholarly contributions exploring the emerging applications of Artificial Intelligence (AI) in Computer Science and Mathematics. The volume highlights the role of intelligent technologies, computational methods, and interdisciplinary research in addressing contemporary challenges and promoting innovation.

The book covers a broad range of topics, including AI algorithms and techniques, Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Data Science, Big Data Analytics, Intelligent Systems, Robotics, Cybersecurity, Blockchain, Cloud and Edge Computing, and the Internet of Things (IoT). It also explores AI applications in business and Industry 4.0, finance and FinTech, healthcare, education, agriculture, environmental sustainability, and engineering sciences.

Furthermore, the volume addresses important mathematical and computational areas such as mathematical modeling, optimization techniques, differential equations, graph theory, game theory, stochastic processes, numerical analysis, simulation, and computational intelligence. Emerging themes such as Generative AI, Large Language Models, Reinforcement Learning, Explainable AI, Quantum Computing, Ethical AI, and Sustainable Computing are also highlighted.

Bridging theoretical foundations with practical applications, this edited volume demonstrates how the integration of AI, Computer Science, and Mathematics can contribute to intelligent decision-making, efficient problem-solving, and technological advancement. It encourages interdisciplinary collaboration and promotes responsible, innovative approaches to emerging research challenges.

Designed for academicians, researchers, postgraduate students, and industry professionals, this book serves as a valuable reference for understanding current developments and future directions in AI-driven research and computational innovation. By bringing together diverse scholarly perspectives, the volume aims to inspire further research, strengthen academic collaboration, and contribute to shaping an intelligent and sustainable technological future.

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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 (IJDST) and has served as the Editor of several academic books. 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.

Prof. Dinesh Kumar Madan

Prof. (Dr.) Dinesh Kumar Madan is a Professor of Mathematics at Chaudhary Bansi Lal University (CBLU), Bhiwani, with over 27 years of academic and administrative experience. His research interests include Mathematical Modeling, Differential Equations, Mechanics of Solids, Theoretical Seismology, and Numerical Methods, with a special focus on the application of mathematics in engineering sciences. He is currently serves as Director of IQAC, Dean of the Faculties of Engineering & Technology and Information Technology, Chairperson of the Departments of Mathematics and Computer Science & Engineering, and In-Charge of the Computer Centre. He has also held several key administrative positions, including Dean Academic Affairs, Controller of Examinations, Proctor, Dean of Colleges, and Finance Officer.

His research contributions include 69 publications in reputed national and international journals, three patents, one registered design, and four books. He has guided eight Ph.D. scholars and eight M.Phil. students and secured research and seminar grants from UGC, AICTE, ICSSR, CSIR, and HSCSIT. He is actively contributing to academic governance as a member of various university councils and serves on the editorial and scientific review boards of several international journals. He has organised and chaired numerous national and international conferences, seminars, and workshops and delivered invited lectures at various institutions.

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