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Novel Developments in Futuristic AI-based Technologies

 Springer

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Preface

This book is a compilation of various topics related to mathematical tools for analysis and decision-making, applications of IoT and digital technology in real life, and applications of technology in medical and agricultural industries. The book covers a wide range of topics that are relevant in today's rapidly changing world, where technology is increasingly becoming a crucial part of our daily lives.

This book focuses on mathematical tools for analysis and decision-making, including topics such as fuzzy risk analysis assessment, in financial portfolio selection, forecasting exchange rates. These mathematical tools play a vital role in solving complex problems. Fuzzy risk analysis assessment, for example, is a mathematical tool that uses fuzzy logic to analyze and assess risks in decision-making problems. Fuzzy logic is a form of logic that allows for the representation of uncertain or imprecise information, making it particularly useful for risk analysis in complex systems. In financial portfolio selection, the multiple criteria hierarchical process is a mathematical tool used to select a portfolio of assets that meets specific criteria, such as risk and return. Forecasting exchange rates is another real-life problem that can be tackled using mathematical tools. One such tool is the hybridization of the ordered weighted averaging (OWA) operator with other methods, which has been shown to improve the accuracy of exchange rate forecasts in diffuse time series. Mathematical tools can also be used to study the properties and behavior of mathematical objects, such as the group of signed quadratic residues. This group has applications in cryptography, where it is used to construct cryptographic protocols that are resistant to certain types of attacks.

The book also delves into the applications of IoT and digital technology in real life, including topics such as cloud-assisted IoT infrastructure with anonymous key issuing, which provides a secure and efficient method of authentication for IoT devices. This approach enables IoT devices to communicate with each other securely, ensuring data privacy and reducing the risk of cyber-attacks. Another application of IoT and digital technology is providing assisted living for visually challenged persons. The Internet of Things (IoT)-based digital life system enables the visually challenged to live an independent life with improved quality of life. Information and Communication Technology (ICT) has also impacted tourist spending, with tourists

increasingly relying on technology to plan and book their trips. Smartphones have become a ubiquitous device in modern society, and their use in retail-purchase buying intentions has been extensively studied. These technologies discussed in section two are transforming the way we live, work, and interact with our environment, and have the potential to revolutionize various industries.

The book also explores the applications of technology in medical and agricultural industries, including topics such as the development of automated breast cancer detection systems, which use machine learning algorithms to analyze mammography images and identify potential tumors. Another application of technology discussed in this book is the Proteomic analysis in the medical industry, which enables the classification and prediction of breast cancer survival rates. Similarly, one can find applications in other industries such as technology, which is being used to manage inventory during pandemics through passive RFID tags, which enable real-time tracking of inventory and reduce the risk of stock-outs. Blockchain is another technology discussed here, which is being used to enhance agriculture supply-chain management, enabling the tracking of products from farm to table and improving transparency and efficiency. These technologies are revolutionizing the way we diagnose and treat diseases, as well as improving the efficiency and sustainability of agricultural practices.

The contributors to this book are experts in their respective fields, and their diverse perspectives and experiences provide valuable insights into the latest trends and developments in the areas of mathematical tools for analysis and decision-making, applications of IoT and digital technology in real life, and applications of technology in medical and agricultural industries. These experts have conducted extensive research, applied their knowledge and skills in solving real-world problems, and shared their experiences and expertise in this book.

We believe that this book will serve as a valuable resource for researchers, students, and practitioners who are interested in these topics. The in-depth analysis, practical applications, and case studies presented in this book will enable readers to gain a comprehensive understanding of the latest developments and emerging trends in these fields.

For researchers, this book provides a wealth of information and insights that can serve as a basis for further research and exploration. Students will find this book an essential resource for understanding the underlying concepts, theories, and applications of mathematical tools for analysis and decision-making, IoT and digital technology, and technology in medical and agricultural industries. Practitioners, including professionals, managers, and executives, will benefit from the practical insights, real-world examples, and case studies presented in this book, which can help them to improve their decision-making and problem-solving skills.

Overall, we hope that this book will be a valuable addition to the existing literature in these fields and will inspire readers to further explore and contribute to the advancement of these important areas of research and practice.

Gandhinagar, India
Ultimo, Australia
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Dr. Manoj Sahni
Dr. José M. Merigó
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We are grateful to Springer Nature for giving us the opportunity to compile this book and for their expert guidance throughout the process. We would like to thank the production staff who have worked tirelessly to ensure that this book meets the highest standards of quality. We are proud to be associated with Springer Nature and grateful for their continued support in disseminating knowledge and advancing research in our field.

Our gratitude is boundless for the extraordinary reviewers who have devoted their time and attention to closely examining our chapters with their perceptive vision. Their invaluable feedback and comments are deeply appreciated and treasured. We owe an immense debt of gratitude to all those who have supported us and made this dream a reality. Our heartfelt thanks to them as they have put their faith in our endeavor and made it possible for us to bring it to fruition.

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possible due to the patience that God graciously bestowed upon us. We are grateful to God for His generous blessings.

We have devoted our time, effort, and passion to crafting this book as accurately and error-free as possible. We would be incredibly appreciative if you have any thoughts, comments, or suggestions that could help us elevate this work to the next level.

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About the Editors

Dr. Manoj Sahni is working as an Associate Professor and Head at the Department of Mathematics, School of Technology, Pandit Deendayal Energy University, Gandhinagar, Gujarat, India. He has more than eighteen years of teaching and research experience. He holds an M.Sc. degree in Mathematics from Dayalbagh Educational Institute (Deemed University), Agra, M.Phil. from I.I.T. Roorkee, and a Ph.D. degree in Mathematics from Jaypee Institute of Information Technology (Deemed University), Noida, India. He has published more than 80 research papers in peer-reviewed journals, conference proceedings, and chapters with reputed publishers like Springer, Elsevier, etc. He has published five research books with reputed publishers like Springer, Taylor & Francis and others. He also serves as Reviewer for many international journals of repute. He is also an editorial board member of many reputed journals. He has conducted the first, second, and third International Conferences on Mathematical Modeling, Computational Techniques, and Renewable Energy in 2020, 2021, and 2022, respectively. He has contributed to the scientific committee of several conferences and associations. He has delivered many expert talks at the national and international levels. He has organized many seminars, workshops, and short-term training programs at PDEU and various other universities. He has also organized a special Symposium at an International Conference (AMACS2018) on Fuzzy Set Theory: New Developments and Applications to Real-Life Problems held in London, UK, in 2018. He is a Member of many international professional societies, including the American Mathematical Society, SIAM, MAA, IEEE, Forum for Interdisciplinary Mathematics, Indian Mathematical Society, IAENG, and many more.

Dr. José M. Merigó (Highly Cited Researcher in Computer Science) is Full Professor at the School of Systems, Management, and Leadership at the Faculty of Engineering and Information Technology at the University of Technology Sydney and Part-Time Full Professor at the Department of Management Control and Information Systems at the School of Economics and Business at the University of Chile. Previously, he was Senior Research Fellow at the Manchester Business School, University of Manchester (UK), and Assistant Professor at the Department of Business Administration at the University of Barcelona (Spain). He holds a Master's and a Ph.D. degrees in Business Administration from the University of Barcelona. He also holds a B.Sc. and M.Sc. degrees from Lund University (Sweden). He has published more than 400 articles in journals, books, and conference proceedings, including journals such as *Information Sciences*, *European Journal of Operational Research*, *IEEE Transactions on Fuzzy Systems*, *Expert Systems with Applications*, *International Journal of Intelligent Systems*, *Applied Soft Computing*, *Computers & Industrial Engineering*, and *Knowledge-Based Systems*. He has also published several books with Springer and with World Scientific. He is on the editorial board of several journals including *Applied Soft Computing*, *Technological and Economic Development of Economy*, *Journal of Intelligent & Fuzzy Systems*, *International Journal of Fuzzy Systems*, *Kybernetes* and *Economic Computation*, and *Economic Cybernetics Studies and Research*. He has also been Guest Editor for several international journals, Member of the scientific committee of several conferences, and Reviewer in a wide range of international journals. Recently, Thomson & Reuters (Clarivate Analytics) has distinguished him as Highly Cited Researcher in Computer Science (2015–2017). He is currently interested in decision-making, aggregation operators, computational intelligence, and bibliometrics and applications in business and economics.

Dr. Walayat Hussain is the Head of the Discipline of Information Technology at Peter Faber Business School, Australian Catholic University, Australia. He has an academic and industry experience of more than 18 years. Before joining the ACU, he was a Lecturer at Victoria University Melbourne, Lecturer and a Post-doctoral Research Fellow at the University of Technology Sydney for seven years. He worked as an Assistant Professor and postgraduate program coordinator at the department of Computer Science at BUITEMS University for many years. He holds a Ph.D., Master, Postgraduate Diploma, and Bachelor's (Hons.) degrees in Computing and Information Systems. Walayat's research areas are Service Computing, Business Intelligence, AI, Information Systems, Computational Intelligence, Machine Learning, and Decision Support Systems. He has contributed to theory and application and developed a new approach for making an optimal informed decision in complex systems. He has published more than 80 high-quality research document in various top-ranked ERA-A*, A, ABDC- A, JCR/SJR Q1 journals. He is currently an Associate Editors for the IET- Communications and Forecasting, international journals, and has been guest editors for more than 25 international journals. He has served as the General Chair. Co-General Chair in multiple international conferences. He is a fellow of European Alliance for Innovation. He has won multiple national and international research awards and recognitions. He is the recipient of the prestigious National

Research Award by the Government of Oman 2021, the VUBS Award for Excellence in Research 2022, the Best Paper Award at IoTaaS Australia 2021, the Best Paper Awards at 3PGCIC 2015, 2016 Poland, South Korea, and FEIT HDR Publication Award by the UTS Australia, 2016.

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