

ARTIFICIAL INTELLIGENCE IN HEALTHCARE SYSTEMS

DIAGNOSTICS, ETHICS AND CLINICAL DECISION SUPPORT

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Artificial Intelligence in Healthcare Systems: Diagnostics, Ethics, and Clinical Decision Support



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Artificial Intelligence in Healthcare Systems: Diagnostics, Ethics, and Clinical Decision Support

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Preface

The rapid advancement of artificial intelligence (AI) has brought transformative changes across industries, with healthcare emerging as one of its most impactful domains. This book, *Artificial Intelligence in Healthcare Systems: Diagnostics, Ethics, and Clinical Decision Support*, aims to provide a comprehensive exploration of how AI technologies are reshaping modern healthcare systems.

The motivation behind this book stems from the growing need to bridge the gap between technological innovation and clinical practice. While AI offers unprecedented opportunities in disease diagnosis, treatment planning, and patient care, it also raises critical ethical, legal, and operational challenges that must be addressed responsibly.

This book is structured to offer a balanced perspective—combining theoretical foundations with practical insights. It explores key areas such as AI-driven diagnostics, machine learning applications in healthcare, clinical decision support systems (CDSS), and the ethical considerations surrounding data privacy, bias, and accountability.

Special emphasis has been placed on making the content accessible to a diverse audience, including students, researchers, healthcare professionals, and policymakers. Each chapter is designed to build a clear understanding of concepts while encouraging critical thinking about the implications of AI in real-world healthcare settings.

We hope this book serves as a valuable resource for those seeking to understand and contribute to the evolving intersection of artificial intelligence and healthcare.

Acknowledgment

The completion of this book would not have been possible without the support, encouragement, and contributions of many individuals and institutions.

We would like to express our sincere gratitude to our academic colleagues and researchers whose valuable insights into artificial intelligence, healthcare systems, and clinical practices have significantly shaped the perspectives presented in this book. Their continuous engagement with emerging technologies and interdisciplinary collaboration has been a constant source of inspiration.

We extend our heartfelt appreciation to healthcare professionals, data scientists, and technology experts who are at the forefront of integrating artificial intelligence into clinical environments. Their real-world experiences and challenges have helped us contextualize theoretical concepts into practical applications.

We are deeply thankful to friends (& their families) for their unwavering support, patience, and encouragement throughout the writing process. Their understanding has enabled us to dedicate the necessary time and effort to complete this work.

Thanks to the students parents for believing in profession and making the students admitted in the colleges.

Thanxs for all the patient's who were treated by the technique which gave a vision of how effectively the treatment can be provided to more patient's so that more patient's can be provided with better health facilities

Finally, we acknowledge the contributions of students and readers whose curiosity and enthusiasm for learning motivate us to explore and present evolving domains such as AI in healthcare.

About the Authors



Dr. Vaibhav Shah is currently Faculty Senior lecturer in SDCH & Research Center Lucknow & had completed his Graduation and Post Graduation in Department of Oral and Maxillo facial Surgery he has a Clinical and academic experience of more than a decade possession of energetic attitude of skilled work, capable of thinking in some what outlandish way of application of unforeseen solutions and ideas in patients care & proactive motivation speaker with National and international research papers to the credit along with of being EDITOR and REVIEWER BOARD MEMBER in various reputed journals of the profession.



Surjya Narayan Sahoo is a PhD researcher in Computer Science and a distinguished technology professional with over twenty years of experience in the information technology industry. His expertise spans Artificial Intelligence, Machine Learning, Data Engineering, and advanced analytics, with specialization in AI-driven financial engineering, quantitative finance, algorithmic trading systems, and healthcare AI platforms. His work focuses on developing scalable, explainable, and trustworthy AI architectures that bridge fundamental research with enterprise-grade implementations in finance and healthcare.

His research interests include agentic AI, multimodal learning, explainable AI, reinforcement learning, portfolio optimization, and responsible AI governance. He actively explores multimodal AI applications in healthcare by integrating clinical data, imaged, genomics, and wearable sensor data for precision medicine and intelligent decision support. Alongside healthcare research, he also works on AI-driven financial systems involving adaptive trading strategies, risk modeling, and portfolio management. His research vision is centered on advancing transparent, human-aligned, and ethically governed AI systems through interdisciplinary research in computer science, finance, and digital health.



Prof. Mohammed Mustafa is a Full Professor of Endodontics in the Department of Conservative Dental Sciences, College of Dentistry, Prince Sattam bin Abdulaziz University, Al-Kharj, Saudi Arabia. He has 20+ years of academic and clinical experience. His area of research interest includes Endodontics, Conservative Dentistry, Dental Biomaterials, AI in Endodontics and Dental Education.

He has over 100+ scientific papers published in high-impact, well-recognised and peer-reviewed journals. His publications are indexed in SCIE-Web of Science, SCOPUS, and PubMed databases. He is on the editorial board and a reviewer for many reputed journals, has contributed book chapters, and also holds some patents in the field of endodontics and in general dentistry. Recently, in 2025, his name has been included in the list of TOP 2% Scientists globally recognised by Elsevier and Stanford University.



Prof. (Dr.) Manoj Kumar Katual, is an eminent Academician with more than 18years of teaching and Research Experience. He was former Dean and Head of Institutions in various Universities and Colleges in India. He is Editor-in-Chief of the prestigious journal "African Journal of Health Sciences. Dr. Katual's research expertise spans Pharmaceutical Biomedical and Healthcare. Additive formulation and development advancements.

His impressive credentials include:

- 125+ scientific articles published in peer-reviewed journals, conferences, and books including SCI/Scopus.
- 9300 citations, H-index of 42 and i-10 index of 210.
- Nominated in India's Top 2% Scientists (Pharmaceutical sciences (2024)
- Edited/authored 30 books, served as Series Editor of 10 books, and Guest Editor of 8 peer-reviewed journals
- Editorial board member of renowned journals 6 patents published, with 5 granted.
- Research Excellence Awardee (2020, 2021,2022, 2023,2024)
- Received more than 35 National and International Awards.

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ABOUT THE BOOK

Artificial Intelligence in Healthcare Systems: Diagnostics, Ethics, and Clinical Decision Support provides a comprehensive and contemporary overview of the integration of AI technologies into healthcare environments.

The book examines how artificial intelligence is revolutionizing diagnostic processes through advanced imaging techniques, predictive analytics, and early disease detection. It highlights the role of machine learning and deep learning in enhancing accuracy, efficiency, and personalized treatment approaches.

A significant focus is placed on Clinical Decision Support Systems (CDSS), demonstrating how AI-driven tools assist healthcare professionals in making informed, evidence-based decisions. The book also explores applications in patient monitoring, drug discovery, and healthcare management systems.

In addition to technological advancements, the book critically addresses the ethical dimensions of AI in healthcare, including data privacy, algorithmic bias, transparency, and regulatory challenges. It emphasizes the importance of responsible AI adoption to ensure patient safety and trust.

Key Features:

Comprehensive coverage of AI applications in healthcare diagnostics

In-depth discussion on clinical decision support systems

Exploration of ethical, legal, and social implications

Integration of theory with real-world case insights

Suitable for academic, research, and professional audiences

This book is an essential resource for students, academicians, healthcare practitioners, and industry professionals interested in understanding the transformative role of artificial intelligence in modern healthcare systems.



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