

Artificial Intelligence and **Big Data** for Medical Image Processing



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Preface

Medical imaging has become an indispensable tool in modern healthcare, enabling clinicians to visualize internal structures of the human body and detect diseases at early stages. With the explosive growth of healthcare data and the advancements in artificial intelligence (AI), the integration of **big data technologies** with **medical image processing** has opened new horizons for research, clinical applications, and decision support systems.

This book aims to provide students, researchers, and professionals with a comprehensive yet concise understanding of how AI and big data are transforming the field of medical imaging. The chapters cover fundamental concepts, state-of-the-art techniques, real-world applications, and emerging challenges, making the book both an academic reference and a practical guide.

We have structured the book to gradually build knowledge — beginning with the basics of medical image processing, progressing through machine learning and deep learning techniques, and culminating with advanced applications and future directions. Each chapter is enriched with examples, case studies, and references to ensure readers gain both theoretical insight and practical exposure.

This work is intended for:

- Undergraduate and postgraduate students of computer science, biomedical engineering, and related fields
- Researchers working on artificial intelligence, big data, and healthcare applications
- Professionals seeking to understand the role of AI and big data in medical imaging systems

It is our hope that this book inspires readers to contribute to the next generation of intelligent healthcare solutions.

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Dedication



To my grandmother, Jayalakshmi,

*You were more than a grandmother—
you were my mother, my guardian, my everything.*

*From the moment I was born, you held my hand,
guiding me with your unconditional love, patience, and strength.*

*For 27 years, your arms were my home,
your words were my wisdom,
your prayers were my protection.*

Losing you has left a silence in my heart that words cannot fill.

*But through this book, a part of you lives on—
because everything I am is shaped by you.*

*I miss you every single day,
and this book is my way of saying:*

Thank you for raising me, loving me, and never letting go.

I miss you deeply, and I carry you in every word I write.

This is for you, Paati. Forever and always.

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This book, **Artificial Intelligence and Big Data for Medical Image Processing**, would not have been possible without the invaluable support, guidance, and inspiration of many individuals.

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My heartfelt thanks also go to my dear friend **Jayashree Ramalingam**, for her understanding, kindness, and the positivity she has always brought into my life. Her constant encouragement and companionship have made this journey smoother and more memorable.

Finally, I dedicate my gratitude to my students, whose curiosity, enthusiasm, and eagerness to learn continue to inspire me every single day. They are a true source of motivation that pushes me to grow as a teacher and a researcher.

Finally, I extend my appreciation to the academic community and publishers for providing platforms to share knowledge that advances both science and society.

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