ARTIFICIAL INTELLIGENCE IN RADIATION ONCOLOGY
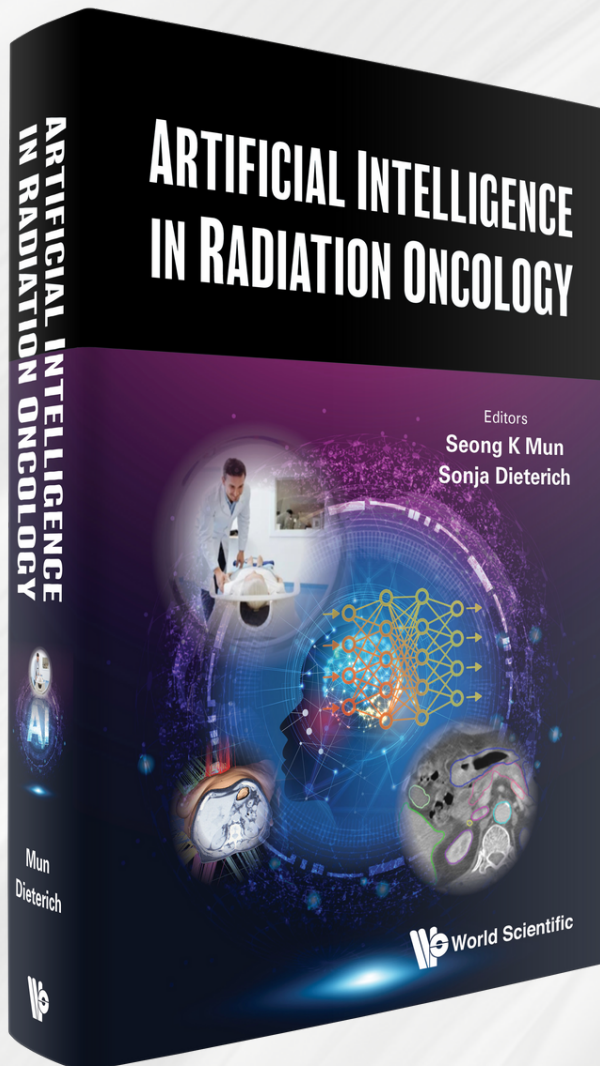
edited by

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This book offers an array of AI scientific concepts, and AI technology tools with selected examples of current applications to serve as a one-stop resource for AI in radiation oncology.

It brings together 30 renowned experts to contribute 16 chapters organized into six sections: Define the Future, Strategy, AI Tools, AI Applications, and Assessment and Outcomes. The future is defined from a clinical and a technical perspective and the strategy discusses lessons learned from radiology experience in AI and the role of open access data to enhance the performance of AI tools. The AI tools include radiomics, segmentation, knowledge representation, and natural language processing. The AI applications discuss knowledge-based treatment planning and automation, AI-based treatment planning, prediction of radiotherapy toxicity, radiomics in cancer prognostication and treatment response, and the use of AI for mitigation of error propagation. The last section elucidates two critical issues in the clinical adoption: ethical issues and the evaluation of AI as a transformative technology.

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About the Editors

Seong Ki Mun is Professor of Physics at Virginia Tech and Director of the Arlington Innovation Center. His research focuses on the role of imaging and information technology in health care settings. Before joining Virginia Tech, he held the positions of research professor of radiology for 27 years at the Georgetown University, during which he served as director of the Division of Imaging Physics (1982-1983) and director of the Imaging Science and Information Systems (ISIS) Center (1984-2007). He is a Fellow of the American Institute of Medical and Biological Engineering, a member of the Engineering in Medicine and Biology Society of IEEE, and a board member of the American Telemedicine Association.

Sonja Dieterich is Professor and Physics Residency Co-Director at UC Davis Radiation Oncology. Steering the development of practical, robust quality control guidelines for the implementation of AI in clinical practice is a major goal of her current work. Prof. Dieterich obtained her PhD in experimental nuclear physics from Rutgers University and trained as a medical physicist at Georgetown University. In 2007, she accepted a faculty position at Stanford University to lead the physics program for robotic radiosurgery. She later became Chief of Clinical Physics at Stanford. In 2012 she went to UC Davis, where she could combine her passions for clinical physics, teaching, Veterinary Radiation Oncology, and also get her MBA. She is Fellow of the American Association of Physicists in Medicine and Chair of its Therapy Physics Committee.