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Oncology -- Computational modeling and AI in radiation neuro-oncology and radiosurgery -- Multimodal neuroimaging computing: Basics and applications in neurosurgery -- The Brain Connectome for Clinical Neuroscience -- Augmented reality in neurosurgery -- Virtual and Augmented Reality in neurosurgery -- Machine Intelligence in cerebrovascular and endovascular neurosurgery -- Computational fluid dynamics in vascular neurosurgery -- Computational fluid dynamics of cerebrospinal fluid -- Computational Neurosurgery in Deep Brain Stimulation -- Computational modeling, augmented reality, and Artificial Intelligence in spine surgery -- Artificial Intelligence in spine and paravertebral muscles analysis -- Computational prognostic modeling in traumatic brain injury -- Comprehensive overview of computational modeling and artificial intelligence in pediatric neurosurgery -- Machine Learning in Pain Neuromodulation -- Neurosurgery and the brain computer interface -- Ethical aspects of computational neurosurgery -- Explainable AI and Laws in Computational neurosurgery.

Sommario/riassunto

This comprehensive and authoritative reference presents the state-of-the-art computational methods applied to the field of neurosurgery. The book brings together leading neuroscientists, neurosurgeons, mathematicians, computer scientists, engineers, ethicists and lawyers, to open the new frontier of computational neurosurgery to a broad audience interested in the translational field of the application of computational models, such as deep learning, to the study of the brain and the practical applications of neurosurgery. The focus is primarily clinical, and there is a solid foundation of research aspects. With forewords by Michael L.J. Apuzzo and Enrico Coiera, the book is organized into 2 sections: (1) tenets of computational modeling, artificial intelligence, computational analysis, and analysis software; (2) computational neurosurgery applications, including neurodiagnostics, neuro-oncology, vascular neurosurgery, all the neurosurgical disciplines, surgical approaches, intraoperative applications, and ethics and legal aspects.