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Nota di contenuto	Understanding Graph Neural Networks: Foundations and Applications -- Neurological Disorders: An Overview of Classification and Diagnosis -- Graph Theory Fundamentals for Brain Network Modeling -- Graph Neural Network Architectures: A Comprehensive Review -- Genetic Influences on Brain Connectivity and Neurological Disorders -- Multi-modal Neuroimaging Data Fusion for GNNs -- Predictive Modeling of Neurological Disease Progression -- Diagnostic Applications of Graph Neural Networks -- Personalized Medicine Approaches in Neurology -- Ethical Considerations in GNN Research for Neurological Disorders -- Network Neuroscience: Bridging Gaps in Understanding Brain Connectivity -- GNNs for Studying Cognitive Disorders: Alzheimer's Disease and Dementia -- Parkinson's Disease: Insights from Graph Neural Network Analysis -- GNNs in Epilepsy Research: Seizure Prediction and Classification -- Neurodevelopmental Disorders and GNN Applications -- Brain Tumor Analysis using Graph Neural Networks -- Stroke and GNN-based Rehabilitation Strategies -- GNNs

for Understanding Neurodegenerative Disorders -- Neuropsychiatric Disorders: Insights from Graph Neural Network Analysis -- Future Directions and Challenges in GNN Research for Neurology.

Sommario/riassunto

This book represents a unique and comprehensive resource for understanding the intersection of advanced artificial intelligence (AI) and neurology. By focusing on graph neural networks (GNNs), the book addresses a crucial gap in the current literature, providing valuable insights into the analysis and interpretation of complex brain networks and neurological data. Intended for a diverse audience, including clinicians, scientists, researchers, and students, it demystifies the complexities of GNNs and their applications in neurology. For clinicians and healthcare practitioners, the book illustrates how GNNs can enhance diagnostic accuracy, inform personalized treatment plans and predict disease progression. This leads to improved patient outcomes and a deeper understanding of neurological conditions such as Alzheimer's, Parkinson's, multiple sclerosis and epilepsy. Researchers will find the book particularly valuable as it delves into the methodologies and technical aspects of GNNs, showcasing their ability to handle diverse data sources including genetic, imaging and clinical information. By integrating these datasets, GNNs reveal hidden patterns and biomarkers, offering new avenues for research and potential therapeutic targets. A Guide to Graph Neural Networks for Neurological Disorders addresses the challenge of missing data, a common issue in neurological research, and demonstrates how GNNs can manage and mitigate these gaps. For students, both undergraduate and postgraduate, the book serves as an educational tool, providing clear explanations and practical examples that make complex concepts accessible. It equips the next generation of neuroscientists and data scientists with the knowledge and skills needed to contribute to this rapidly evolving field. The book aims to provide a foundational understanding of GNNs, demonstrate their practical applications in neurology, and inspire further research and innovation. By bridging the gap between AI and medical practice, the book empowers readers to leverage cutting-edge technology in the quest to understand and treat neurological illnesses, ultimately enhancing the quality of care and advancing the field of neuroscience.