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	Descrizione fisica	1 online resource (391 pages)
	Collana	Understanding Complex Systems, , 1860-0840
	Disciplina	530.1
	Soggetti	System theory
		Artificial intelligence
		Quantum theory
		Quantum electrodynamics
		Biophysics
		Epidemiology
		Complex Systems
		Artificial Intelligence
		Quantum Physics
		Quantum Electrodynamics, Relativistic and Many-body Calculations
		Teoria de sistemes
		Intel·ligència artificial
		Teoria quàntica
		Electrodinàmica quàntica
		Biofísica
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		Sistemes complexos
		Llibres electrònics
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	Livello bibliografico	Monografia
	Nota di contenuto	Chapter 1. Complex systems and machine learning -- Chapter 2. Regression and Classification -- Chapter 3. Data manipulation techniques -- Chapter 4. Artificial neurons and deep learning --

Chapter 5. Powerful neural network architectures -- Chapter 6. Autoencoders and more -- Chapter 7. The Discrete Nonlinear Schr¨odinger Equation -- Chapter 8. Learning Analytical Solutions -- Chapter 9. The targeted energy transfer model -- Chapter 10. Dynamical embedding with autoencoders -- Chapter 11. Chimeras -- Chapter 12. Branching -- Chapter 13. Discrete breathers -- Chapter 14. Quantum targeted transfer with machine learning -- Chapter 15. Learning quantum systems -- Chapter 16. Action potential propagation in the heart -- Chapter 17. Machine learning cardiology -- Chapter 18. Epidemiology with physics informed machine learning -- Chapter 19. Foundations -- Chapter 20. Computational complexity and the butterfly effect.

| Sommario/riassunto | This book serves as a comprehensive introduction to nonlinear complex systems through the application of machine learning methods. Artificial intelligence (AI) has affected the foundations of scientific discovery, and can therefore lend itself to developing a better understanding of the unpredictable nature of complex dynamical systems and to predict their future evolution. Utilizing Python code, this book teaches and applies machine learning to topics such as chaotic dynamics and time-series analysis, solitons, breathers, chimeras, nonlinear localization, biomolecular dynamics, and wave propagation in the heart. The consistent integration of methods and models allow for readers to develop a necessary intuition on how to handle complexity through AI. This textbook contains a wealth of expository material, code, and example problems to support and organize academic coursework, allowing the technical nature of these areas of study to become highly accessible. Requiring only a basic background in mathematics and coding in Python, this book is an essential text for a wide array of advanced undergraduate or graduate students in the applied sciences interested in complex systems through the lens of machine learning. |