

Automated Machine Learning for Data-centric Systems

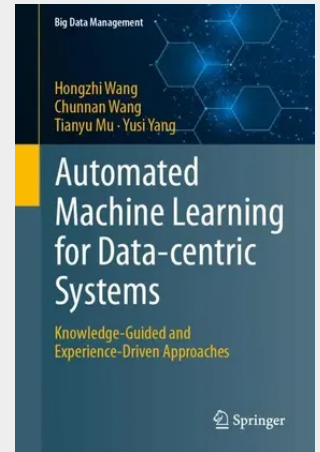
Knowledge-Guided and Experience-Driven Approaches

provides a system-oriented and knowledge-driven perspective on automated machine learning in modern data-centric environments. As machine learning models become core components of data management systems, the manual design and optimization of models increasingly limit scalability, reproducibility, and long-term adaptability. This book addresses these challenges by rethinking AutoML not merely as a collection of optimization algorithms, but as a foundational capability embedded within data-centric systems.

The book presents a unified framework that connects core AutoML techniques—such as hyperparameter optimization, combined algorithm selection and configuration, neural architecture search, and model compression—with system-level considerations and diverse data scenarios. It emphasizes how knowledge, experience, and structural properties of data can guide automation, enabling AutoML systems to move beyond blind search toward more efficient, interpretable, and sustainable model design. Through detailed discussions of temporal, sequential, graph, and federated data settings, the book demonstrates how AutoML techniques can be adapted to real-world constraints including data heterogeneity, resource limitations, and deployment complexity.

Designed for researchers, graduate students, and practitioners, this book bridges the gap between algorithm-centric AutoML research and the practical needs of data-centric systems. By integrating theoretical foundations with system-level insights and emerging research directions, Automated Machine Learning for Data-centric Systems serves as both a comprehensive reference and a forward-looking guide for building scalable, intelligent, and automated data-driven systems.

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