

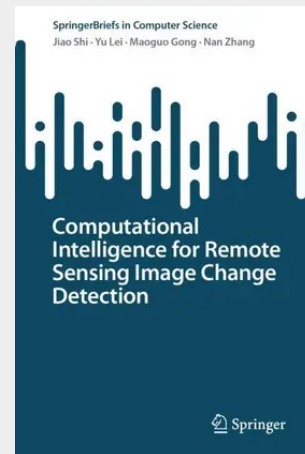
Computational Intelligence for Remote Sensing Image Change Detection

Nowadays, remote sensing systems and technologies have been widely studied and applied in environmental monitoring, land survey, and disaster management. As a pivotal remote sensing task, change detection aims to identify and quantify spatio-temporal changes using multi-temporal imagery, supporting timely decision-making and sustainable resource planning. Nevertheless, conventional change detection approaches remain limited in addressing challenges including sensitivity to noise, discrepancies in spatial resolution, sensor misalignment, and the fusion of multi-source heterogeneous data. To address these issues, advanced computational intelligence (CI) techniques, particularly deep learning and evolutionary computation, are being increasingly adopted, offering improved robustness and adaptability for modern change detection tasks.

This book establishes the first systematic framework of CI-driven methodologies in remote sensing change detection, providing a comprehensive exposition spanning theoretical foundations, algorithmic innovation, and empirical validation. Opening with the research principles of remote sensing change detection and core CI theories, it covers CI-driven methodologies tailored to homogeneous (e.g., single-sensor time series) and heterogeneous (e.g., cross-sensor) paradigms. These methodologies address domain-critical challenges such as noise robustness, feature space alignment, and multi-source fusion through rigorously designed technical workflows that cover data preprocessing, adaptive model learning, and task-specific network architecture. Extensive validation across diverse remote sensing data types—including synthetic aperture radar, optical, multispectral, and hyperspectral imagery—empirically confirms the operational efficacy of these methodologies in delivering accurate and robust change monitoring.

By bridging theory and practice, this book empowers readers to formulate complex problems, develop robust models, and apply cutting-edge CI techniques to remote sensing change detection tasks. It is ideal for researchers and engineers working at the intersection of remote sensing, machine learning, and computational intelligence who seek practical and scalable solutions for change detection in evolving environments.

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