

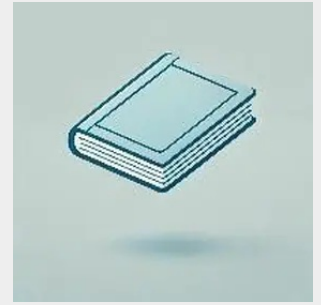
# Reshaping Geotechnical Engineering with Machine Learning

Theory, Applications, and Innovations

Reshaping Geotechnical Engineering with Machine Learning: Theory, Applications, and Innovations explores the transformative impact of machine learning (ML) on the field of geotechnical engineering. The book begins by examining the broad applications of ML in key areas such as foundation engineering and slope stability, demonstrating how advanced algorithms can enhance predictive accuracy and decision-making. It emphasizes the importance of robust data acquisition and preprocessing techniques, which are critical for the successful implementation of ML models in geotechnical contexts. The text examines the use of machine learning for predicting soil behavior, a complex challenge in geotechnical engineering, and highlights its role in risk assessment and management. In addition, it also addresses the integration of ML with finite element modeling to improve the analysis of tunnel and underground stability. The applications of machine learning in understanding geotechnical materials further showcase the versatility of these techniques. It also covers experimental investigations, including laboratory and field studies, which provide essential data for model training and validation. Through detailed case studies, the book illustrates practical implementations of machine learning, bridging theory and real-world problem-solving.

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