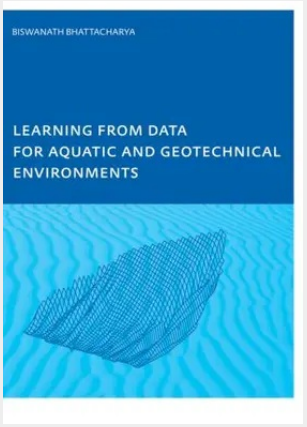
Bhattacharya

Learning from Data for Aquatic and Geotechnical Environments



The book presents machine learning as an approach to building models that learn from data, and that can be used to complement the existing modelling practice in aquatic and geotechnical environments. It provides concepts of learning from data, and identifies segmentation (clustering), classification, regression and control as the learning tasks. A unified methodology based on the concepts of machine learning, information theory and statistics is presented that can be followed to build models using data as well as expert knowledge. Several machine learning methods are used to extract features to build data-driven models in geotechnics. A set of regression models are built to predict sediment transport rates and assess harbour sedimentation. Controllers that replicate the control strategy of model-based optimal controllers of water systems are built for situations where fast and accurate decisions are needed. The models built demonstrate excellent performance; they may complement or even replace the existing models and can be used in practice. The performance of the models proves the effectiveness of the methodology and machine learning in general.

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