Application of Machine Learning Ensemble Modeling for Predicting Seismic Responses in LCRB Systems

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Abstract:

This study focuses on leveraging ensemble modeling techniques in machine learning to predict seismic responses specifically in Lead Core Rubber Bearing (LCRB) systems. Ensemble modeling involves combining multiple models to improve predictive accuracy, which can be particularly effective in complex systems like those involved in seismic response prediction. A comprehensive set of parameters influencing the seismic isolated building and isolation system are carefully considered for machine learning analysis. By adopting an ensemble modeling approach, which combines Random Forest, K-Nearest Neighbors, Support Vector Machine, and Artificial Neural Network techniques, the study achieves significantly enhanced predictive accuracy compared to individual models. This research contributes to the advancement of predictive modeling in earthquake engineering, offering insights into improving the seismic performance of LCRB systems for enhanced structural resilience.