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Interpretation and Prediction of Geotechnical Soil Parameters Using Ensemble Machine Learning

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Abstract : This paper delves into the development of a sophisticated desktop application designed to calculate soil bearing capacity and predict limit pressure. Drawing from an extensive review of existing methodologies, the study meticulously examines various approaches employed in soil bearing capacity calculations, elucidating their theoretical foundations and practical applications. Furthermore, the study explores the burgeoning intersection of artificial intelligence (AI) and geotechnical engineering, underscoring the transformative potential of AI- driven solutions in enhancing predictive accuracy and efficiency.Central to the research is the utilization of cutting-edge machine learning techniques, including Artificial Neural Networks (ANN), XGBoost, and Random Forest, for predictive modeling. Through comprehensive experimentation and rigorous analysis, the efficacy and performance of each method are rigorously evaluated, with XGBoost emerging as the preeminent algorithm, showcasing superior predictive capabilities compared to its counterparts. The study culminates in a nuanced understanding of the intricate dynamics at play in geotechnical analysis, offering valuable insights into optimizing soil bearing capacity calculations and limit pressure predictions. By harnessing the power of advanced computational techniques and AI-driven algorithms, the paper presents a paradigm shift in the realm of geotechnical engineering, promising enhanced precision and reliability in civil engineering projects.

Keywords : limit pressure of soil, xgboost, random forest, bearing capacity
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