



PLENARY LECTURE

Overcoming Data Scarcity with Machine Learning Tools in Medical, Chemical, Energy, and Archaeology Applications

by

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Summary

In certain fields, data scarcity can hinder progress in AI and data-driven modeling.

This plenary talk focuses on surgical simulation, wind energy harvesting, chemical engineering, and computational archaeology and the challenges of acquiring patient-specific, environment-specific, and archaeological site-specific data.

To address data scarcity, pre-training on generic representations that can be updated in real-time as system-specific data is acquired can lead to more accurate and patient-specific simulations.

However, open problems remain, such as developing realistic surgical models, effective wind energy prediction algorithms, and uncovering hidden patterns in archaeology data.

Overcoming data scarcity is a crucial step in advancing our understanding of complex systems and making accurate predictions.

This talk references review papers and research articles that explore error estimation, parameter estimation, poromechanics, and uncertainty quantification, which highlight the potential of machine learning tools in overcoming data scarcity.