THE JOURNAL OF ENGINEERING
IET Open Access Research

Machine Learning; Findings on Machine Learning Detailed by Investigators at University of Texas Austin (Demonstration and Mitigation of Spatial Sampling Bias for Machine-learning Predictions)

2021 DEC 13 (VerticalNews) -- By a News Reporter-Staff News Editor at Journal of Engineering -- Investigators discuss new findings in Machine Learning. According to news reporting originating in Austin, Texas, by VerticalNews journalists, research stated, "Machine learning provides powerful methods for inferential and predictive modeling of complicated multivariate relationships to support decision-making for spatial problems such as optimization of unconventional reservoir development. Current machine-learning methods have been widely used in exhaustive spatial data sets like satellite images."

The news reporters obtained a quote from the research from the University of Texas Austin, "However, geological subsurface characterization is significantly different because it is conditioned by sparse, nonrepresentative sampling. These sparse spatial data sets are generally not sampled in a representative manner; therefore, they are biased. The critical questions are: first, does spatial bias in training data result in a bias for machine-learning-based predictive models; and if there is a bias, how can we mitigate the bias in these spatial machinelearning-based predictions? The presence and mitigation of prediction with spatial sampling bias is demonstrated with tree-based machine learning due to its high degree of interpretability. In expectation, training data bias imposes bias in machine-learning predictions over a wide variety of spatial data configurations and degrees of bias, even when the model is applied to make predictions with unbiased testing and realworld data. We reduce the bias in prediction with a novel spatial weighted tree method over a variety of spatial data configurations and degrees of spatial sampling bias. The proposed method is able to improve the accuracy for reservoir evaluation."

According to the news reporters, the research concluded: "We recommend modeling checking and bias mitigation for all machine-learning prediction models with sparse, spatial data sets, because bias in, bias out."

This research has been peer-reviewed.

For more information on this research see: Demonstration and Mitigation of Spatial Sampling Bias for Machine-learning Predictions. SPE Reservoir Evaluation & Engineering, 2021;24(1):262-274. SPE Reservoir Evaluation & Engineering can be contacted at: Soc Petroleum Eng, 222 Palisades Creek Dr, Richardson, TX 75080, USA.

Our news correspondents report that additional information may be obtained by contacting Wendi Liu, University of Texas Austin, Austin, TX 78712, United States. Additional authors for this research include Svetlana Ikonnikova, H. Scott Hamlin, Livia Sivila and Michael J. Pyrcz.

Keywords for this news article include: Austin, Texas, United States, North and Central America, Cyborgs, Emerging Technologies, Information Technology, Machine Learning, University of Texas Austin.

Document JOENG00020211213ehcd000g2