THE JOURNAL
OF ENGINEERING
IET Open Access Research

Machine Learning; New Findings from University of Texas Austin in the Area of Machine Learning Reported (Machine Learning In Ground Motion Prediction)

479 words
19 April 2021
Journal of Engineering
JOENG
1354
English
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2021 APR 19 (VerticalNews) -- By a News Reporter-Staff News Editor at Journal of Engineering -- Research findings on Machine Learning are discussed in a new report. According to news originating from Austin, Texas, by VerticalNews correspondents, research stated, "This paper studies the advantages and disadvantages of different machine learning techniques in predicting ground-motion intensity measures given source characteristics, source-to-site distance, and local site conditions. Typically, linear regression-based models with predefined equations and coefficients are used in ground motion prediction."

Financial supporters for this research include Texas Department of Transportation (TxDOT), State of Texas through the TexNet Seismic Monitoring Project, Industrial Associates of the Center for Integrated Seismic Research (CISR) at the **Bureau of Economic Geology** of The University of Texas.

Our news journalists obtained a quote from the research from the University of Texas Austin, "However, restrictions of the linear regression models may limit their capabilities in extracting complex nonlinear behaviors in the data. Therefore, the present paper comparatively investigates potential benefits from employing other machine learning techniques as statistical method in ground motion prediction such as Artificial Neural Network, Random Forest, and Support Vector Machine. This study quantifies event-toevent and site-to-site variability of the ground motions by implementing them as random effect terms to reduce the aleatory uncertainty. All the algorithms are trained using a selected database of 4528 ground-motions, including 376 seismic events with magnitude 3 to 5.8, recorded over the hypocentral distance range of 4-500 km in Oklahoma, Kansas, and Texas since 2005. The results indicate the algorithms satisfy some physically sound characteristics such as magnitude scaling distance dependency without requiring predefined equations or coefficients. Moreover, it is found that, when sufficient data is available, all the alternative algorithms tend to provide more accurate estimates compared to the conventional linear regression-based method, and particularly, Random Forest outperforms the other algorithms."

According to the news editors, the research concluded: "However, the conventional method is a better tool when limited data is available."

This research has been peer-reviewed.

For more information on this research see: Machine Learning In Ground Motion Prediction. Computers & Geosciences, 2021;148. Computers & Geosciences can be contacted at: Pergamon-elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, England. (Elsevier - www.elsevier.com; Computers & Geosciences - www.journals.elsevier.com/computers-and-geosciences/)

The news correspondents report that additional information may be obtained from Farid Khosravikia, University of Texas Austin, Dept. of Civil Architectural and Environmental Engineering, Austin, TX 78712, United States.

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

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Document JOENG00020210419eh4j000rs