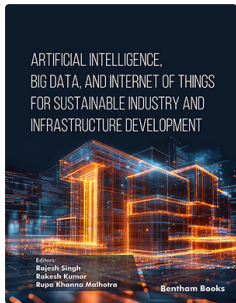




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Utilizing Fractal Analysis and Machine Learning to Enhance Natural Disaster Prediction and Foster Resilient Smart City Development

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Abstract

Disasters, which occur in periodic intervals, are natural phenomena such as floods, landslides, etc. Nowadays, they are more frequent due to the effects of global warming. These natural phenomena possess complex dynamics, making their precise prediction a difficult task. The intention of smart cities is to use the advanced technologies for flexible and sustainable solutions to such threats. In this paper, we present a new and efficient approach for extending natural thread prediction using mathematical fractal analysis to identify self-similar, multi-scale information that can be incorporated into machine learning prediction models for natural disasters. In addition, we used fractal generation techniques to create virtual replicas of the metropolitan infrastructure in order to model reactions to extreme event forecasts. Our multimodal method, at the nexus of urban modeling, machine learning, and fractal mathematics, offers a groundbreaking way to improve climate preparedness for smart cities. Adaptive resilience planning and early warning systems can benefit from the application of data-driven infrastructure response techniques and catastrophe prediction methodology.

Keywords: [Convolutional neural networks](#), [Climate resilience](#), [Disaster preparedness](#), [Early warning systems](#), [Fractal analysis](#), [Hurricane forecasting](#), [Infrastructure planning](#), [Long short-term memory](#).

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