Flood Forecasting With Xai

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XAI stands for Explainable Artificial Intelligence. The goal of XAI is to make AI more transparent, trustworthy, and interpretable, especially in complex models like deep learning and neural networks, which are often considered “black boxes.”

Use in flood forecasting

The paper “Spatial flood susceptibility mapping using an explainable artificial intelligence (XAI) model” by Biswajeet Pradhan, Saro Lee, Abhirup Dikshit, and Hyesu Kim introduces an innovative approach to flood risk assessment through the use of explainable AI (XAI). This is particularly significant because traditional machine learning (ML) and deep learning models, while accurate, have often been criticized for their “black box” nature. This study addresses this issue by utilizing Shapley additive explanations (SHAP) to make the model’s predictions more transparent.

The authors applied a convolutional neural network (CNN) model, combined with SHAP, to map flood susceptibility in Jinju, South Korea. The model achieved an impressive 88.4% accuracy, making it a compelling alternative to other mapping techniques. What sets this paper apart is its focus on explainability. By identifying land use and soil characteristics as major contributors to flood risk, the model offers valuable insights for stakeholders, especially those involved in disaster mitigation.

A standout feature of this study is the practical application of SHAP plots to demystify how various factors—such as soil drainage, surface soil texture, and elevation—contribute to flood susceptibility. This interpretability makes the model not only a tool for accurate prediction but also a framework for informed decision-making in flood-prone areas. The focus on Jinju’s historical flood data, combined with the integration of topographical, lithological, and soil attributes, underscores the robustness of the model.

However, a potential limitation is the study’s geographic specificity. While the model is highly effective for the Jinju region, its performance in different environments with varied climatic and geographical conditions remains to be seen. Expanding this approach to other flood-prone areas worldwide would further validate the model’s versatility.

In conclusion, this paper marks a significant step forward in flood susceptibility mapping by balancing the power of deep learning with the necessity of transparency. The authors’ successful application of XAI could lead to wider adoption of AI-driven models in disaster management, as it provides both accuracy and explainability—key elements for trust and practical use in real-world scenarios.

Reference: Pradhan, B., Lee, S., Dikshit, A., & Kim, H. (2023). Spatial flood susceptibility mapping using an explainable artificial intelligence (XAI) model. *Geoscience Frontiers*, *14*(6), 101625. https://doi.org/10.1016/j.gsf.2023.101625