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Deep learning, remote sensing and visual analytics to support automatic flood detection

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Floods can have devastating consequences on people, infrastructure, and the ecosystem. Satellite imagery has proven to be an efficient instrument in supporting disaster management authorities during flood events. In contrast to optical remote sensing technology, Synthetic Aperture Radar (SAR) can penetrate clouds, and authorities can use SAR images even during cloudy circumstances. A challenge with SAR is the accurate classification and segmentation of flooded areas from SAR imagery. Recent advancements in deep learning algorithms have demonstrated the potential of deep learning for image segmentation demonstrated. Our research adopted deep learning algorithms to classify and segment flooded areas in SAR imagery. We used UNet and Feature Pyramid Network (FPN), both based on EfficientNet-B7 implementation, to detect flooded areas in SAR imagery of Nebraska, North Alabama, Bangladesh, Red River North, and Florence. We evaluated both deep learning methods' predictive accuracy and will present the evaluation results at the conference. In the next step of our research, we develop an XAI toolbox to support the interpretation of detected flooded areas and algorithmic decisions of the deep learning methods through interactive visualizations.