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Impact based alerting system using AI-based radar maps from satellite observations

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Understanding global precipitation is vital for both tracking the hydrological cycle and predicting extreme weather events. However, the substantial costs involved in installing and maintaining weather radar systems create significant barriers for developing countries, especially those at elevated risk for weather-related disasters. This financial constraint severely limits these countries' capabilities in natural disaster preparedness and response. To mitigate this issue, our research leverages advancements in deep learning to offer a more cost-effective and accessible solution. We propose the use of deep learning models for the generation of weather radar images derived from geostationary satellite data. Specifically, we utilize the Pix2PixCC model, a variation of the conditional Generative Adversarial Network (cGAN), for this purpose. We evaluate the model's performance against established rain rate products to assess its accuracy and reliability. Using GeoKOMPSAT-2A satellite images as input data, our model achieved a correlation coefficient and RMSE of 0.79 and 5.37 mm/h, respectively. These results are from three input channels of visible, Infrared, and water vapor for the summer season precipitation cases. It demonstrates a significant improvement over other geostationary satellite-based product. In conclusion, our deep learning approach offers a scalable, cost-effective alternative for precipitation monitoring. By integrating this technique into impact-based alerting systems, we aim to substantially alleviate the

challenges associated with natural disaster preparedness and response in developing countries at high risk of flooding.