FloodCast: Real-Time Flood Mapping and Prediction in Southeast Asia Using Remote Sensing Data

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Floods kills 6,000 people annually and is especially dangerous for the region of Southeast Asia, where 1.24 billion people are at risk of flooding. Flood mapping often uses ground measures, but they only measure water height, are spatially limited, and can be expensive to maintain–which isn't feasible for Southeast Asia. High resolution synthetic-aperture rada (SAR) imagery offers continuous observation of the Earth surface and is ideal for flood mapping. Neural network mathematically determines flooding pixel by pixel. My most successful model had a >0.80 IoU and thus successfully captured polarized SAR data, allowing for real-time flood mapping of SEA. In addition to topological and hydrological data, this project establishes a strong correlation between flood risk and soil moisture. A machine learning model trained upon these factors was first validated in Iowa due to high quality hydrological modeling and frequent flooding. Due to lack of tuning and subnational ground truth data, this model was applied to SEA. FloodCast proved to have less than 5% of error compared to actual flooding events in SEA and was more than 90% accurate in real-time flood prediction, surpassing the gold standard. The project's versatility and simplicity proves that anyone with a computer can map and predict floods, an invaluable tool.

Awards Won:
National Oceanic and Atmospheric Administration - NOAA: Taking the Pulse of the Planet First Award
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $52,000 each)
U.S. Agency for International Development: USAID Science for Development First Award - Working in Crisis and Conflict