

## Grad-CAM will tell the important regions to predict the typhoon intensity

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Because typhoons are often highly destructive, their accurate prediction has been of particular importance in the field of weather forecasting. Although there has been relatively steady improvement over the years in track forecasting with ever improving numerical models, the accuracy of intensity forecasts still lags that of the track forecasts. We here adopt an artificial intelligence approach essentially different from the conventional one based on the global spectral model. We predict the 24-hour typhoon intensities from the past satellite images using the convolutional neural network (CNN), which has been established as a powerful classification model for image recognition problems. Moreover, we conduct a sensitivity analysis of the prediction model using a gradient-weighted class activation mapping (Grad-CAM) technique, which produces a localization map highlighting the important regions in the image for predicting 24 hours after typhoon intensity. The results suggest that the shape of clouds surrounding the core of typhoon such as rainbands is more crucial than that of the typhoon itself to predict the intensity.

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