

Estimation of Tropical Cyclone Intensity Based on Deep Learning and Transfer Learning Using Geostationary Satellite Images

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Tropical cyclones (TCs) are one of the most intense and destructive natural phenomena, causing numerous casualties and social and economic impacts. Accurately estimating and predicting TC intensity is essential to reducing TC damages. This study develops the Convolutional Neural Network (CNN) model to estimate TC intensity in the western North Pacific (NWP) using the Geo-KOMPSAT-2A (GK2A) satellite images. Given the insufficient GK2A data, the present study adapts a transfer learning technique, which uses information learned from available Communication, Ocean, and Meteorological Satellite (COMS) satellite images, to develop the model. Since transfer learning technique can improve learning a new task through the transfer of knowledge from a task that has already been trained, it works effectively when the two data properties are similar. Because COMS and GK2A satellite data use four similar infrared channels, the current CNN model based on transfer learning techniques significantly improved the TC intensity estimation.

Key words: Tropical cyclone Intensity, Geostationary Satellite Images, Convolutional Neural Networks, Transfer Learning

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