

Automatic detection of weather front around Japan using deep convolutional neural network

*Daisuke Matsuoka^{1,2}, Shiori Sugimoto¹, Yujin Nakagawa¹, Fumiaki Araki¹, Shintaro Kawahara¹, Yosuke Onoue⁴, Masaaki Iiyama³, Koji Koyamada³

1. Japan Agency for Marine-Earth Science and Technology, 2. Japan Science and Technology Agency, 3. Nihon University, 4. Kyoto University

In this study, we automatically detect stationary front from weather forecast simulation data (GPV/MSM) using U-Net deep convolutional neural network. Our U-Net trains ten years weather data (precipitation, sea level pressure, relative humidity, air temperature, and wind velocity) and the position of weather front as the ground truth. As a result of applying the trained U-Net to the untrained one year data, our approach succeeded in accurately detecting Baiu front and autumn rain front except when Typhoon occurred. Moreover, wind velocity (zonal and meridional component) and relative humidity at 1000 hPa play an important role to obtain high detection performance. Our approach is also able to apply to weather simulation data which the weather front is not associated with.

Keywords: Deep learning, Convolutional neural network, Weather front detection