

Developing a Deep Learning tool for Map Tiles

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Most GIS analysis requires much time for preparing data, such as download, extract compressed file, merge, transform and subset. These are not the essence of GIS analysis, but important and indispensable preparatory processes. Recently, many geospatial data are provided in Map Tile format, such as Slippy Map, WMTS, and others. In general, these Map Tiles are used as background images for Web Map Services. However, we can obtain formulated geospatial data from Map Tile services with simple structures, such as “url/zoom-level {Z} /x-coordinate{x} /y-coordinate{y}.ext”. In other words, we can provide huge and various geospatial data with less preparation process. This makes it easy to implement Deep Learning using geospatial information, which requires large amounts of training and supervised data. In this research, we used the TensorFlow as a deep learning framework and pix2pix, an image-to-image translation program with Conditional Adversarial Networks (cGAN). This neural network is trained with a pair of input (training) and target images, and we can obtain comparable pair images with Map Tiles. We developed 1. script for obtaining image pairs from a Web service, such as Slippy Map, WMTS and WMS, 2. script for training a neural network, and 3. script and QGIS plugin to generate maps with trained neural networks. We performed image translation with these programs from DEM and Landsat images to vegetation maps in the Kanto region, Japan. This program can process different kinds of geospatial data integrally. The training result is uploaded to https://naro-41605.github.io/pix2pix_map_tiles/lad2veg/output/index.html. In conclusion, these programs make it easy to apply deep learning methods for map tile data and are expected to be useful for various applications such as land-use classification and change detection.