Assessing the Urban classification Using Geospatial Analysis

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Project Summary

This project automatically classifies the urban area using geospatial analysis. This project starts by downloading Sential 2 data (because some of the scihub.copernicus is not maintained, we can not automatically download it) and selecting an interesting area from geojson polygon data. The Python package we are using is mainly *arcpy* and *rasterio.* We start by combining multiple bands, including B02, B03, B04, and B08, into one single geo-tiff file and then merging each geo-tiff file that covers the regions in which we are interested. Finally, to classify the result, this project uses the Iso Cluster Unsupervised Classification algorithm from Esri to classify our extracted geo-tiff file in the given region near Detroit into 8 categories. Consequently, we only select the classified urban areas as our interesting features and extract the urban shape of this city. Using our Python code, we can start by downloading necessary geo-tiffs and then automatically extract the urban changes in a given area for multiple periods to see the city's expansion. The result is shown in the figure below.

However, there are some limitations, the original graph is too large which means that we are not able to conduct the whole analysis from everywhere in the world. Besides, the automation is not perfect, because we are not able to download the tiff data just in the given area automatically. Lastly, the classification algorithm is not perfect, because the result is not very accurate compared with recent literature.

Note: the *clean.ipynb* is the cleaning of the geo-tiff files (combine and merge), *analysis.ipynb* is the process to clean the final interesting tiff file and *final result.ipynb* is to conduct the final result of the classification.
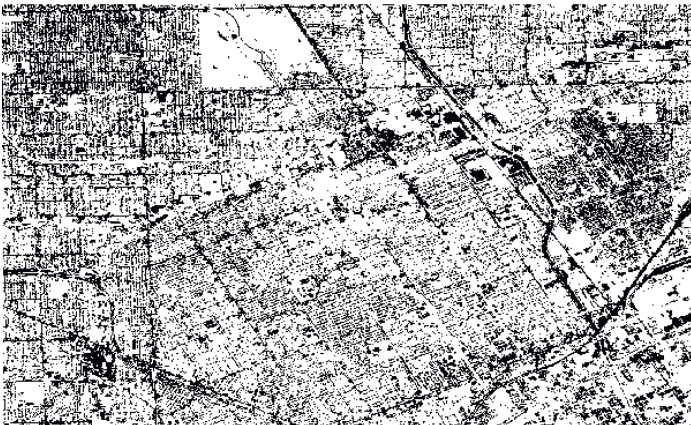

Figure 1: Urban Classification

Figure 2: Original Graph

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