**Comparison of inpainting methods for generating true orthoimages  
from single satellite images**

Seunghee Kim, Taejung Kim\*

Dept. of Geoinformatic Engineering, Inha University, Republic of Korea

tezid@inha.ac.kr\*

***ABSTRACT***

Orthorectified satellite images are subject to occlusions such as cloud cover or relief displacement of above-ground structures. These occlusions are judged to be errors and need to be removed, and various gap filling methods are being developed for the removed gap areas. Gap filling is typically performed using multi images collected from different camera location that possess texture information over the gap areas. However, there are challenges with data compatibility and data collection, in particular, for satellite imagery. Moreover, when blank areas occur in urban areas, more images are required for natural gap filling. Therefore, we applied various inpainting techniques to fill the gaps based on a single satellite image and compared the inpainting results. In this study, we classified inpainting techniques into two categories: traditional computer vision-based algorithms and machine learning-based algorithms. Traditional computer vision-based algorithms mainly use the relationship between neighboring pixels to estimate the value of the target pixel. In contrast, machine learning-based algorithms use training data to build a model that generates new values for the blank areas. We selected a residential area for inpainting test and the other area for training from the 0.5 cm high resolution satellite image. We extracted 64\*64 patches from the traning area and used them for model training. As a result, inpainting was successfully performed using a single satellite image as input, including training data generation. Compared to the traditional computer vision methods, the images generated using the machine learning model exhibited more natural appearance. In particular, the results were more similar to the surroundings in urban centers with a large number of white spaces. Further analysis is needed using selected high-quality training data and models with advanced architectural structures.

**Keywords:** Satellite Image, True Orthorectification, Inpainting, Machine Learning, Urban