Detecting Outliers in Crowd-sourcing Drone Image Data with Radiometric Quality Verification

Ryunghyeok Im[1], Kyongah Choi[1], Dongho Lee[1]*

[1] Korea Research Institute for Human Settlements

Recently, the crowd-sourcing data method has been drawing attention as a means to solve the limitations of the national geospatial data system. However, it is difficult to trust the quality of crowd-sourcing spatial data acquired for popular and diverse purposes rather than specialized purposes to be utilized for renew national geospatial data. Therefore, it is very important to secure the reliability of data quality in order to utilize crowd-sourcing spatial data for renew national geospatial data. In the Korea national geospatial data system, data quality is managed with surveying regulations notified by the Ministry of Land, Infrastructure and Transport and the National Geographic Information Institute. However, there are no guidelines related to crowd-sourcing spatial data yet. As a preliminary step to establishing guidelines, it is necessary to determine the quality factors of crowd-sourcing spatial data and evaluate them. The quality factors of crowd-sourcing geospatial data include data validity, geometric quality, and radiometric quality. In this study, we propose a method to evaluate and verify the radiometric quality, which is important for the matching of drone image data, among the quality verification factors. The proposed method is as follows. The original reference data is a drone image dataset containing metadata such as exterior orientation parameter and interior orientation parameter. First, we randomly corrupt the image quality in the original reference data to generate a experimental test dataset for evaluation. We define the corrupted dataset as crowd-sourcing spatial data that has been acquired in non-professional purposes. Among the methods used in the computer vision to evaluate image quality, we applied the No-Reference Image Quality Assessment Method, which does not require a reference image, to the test dataset. The experimental results show that the outliers have different aspects than the reference images. Next, we applied the image matching method to establish radiometric quality verification criteria for crowd-sourcing spatial data based on the IQA scores verified in the experiment. We extracted the tie points between neighboring images, which are calculated in the image matching step, and checked the distribution of tie points detected in each image. As a result of the comparison, we found that the distribution of tie points in the outlier data shows an abnormal distribution compared to normal images. In this study, we investigated how to detect and verify outliers in crowd-sourcing drone image data through two methods: image quality assessments method and image matching method. Through this study, we expect to be able to evaluate the quality of crowd-sourcing drone image data before using it to first determine. In future research, we would like to study how to improve the quality of detected outlier images.

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