

Special Issue on Image Simulation in Remote Sensing

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1. Introduction

Recently, various remote sensing sensors have been used and their performance has developed rapidly [1]. Therefore, the range of remote sensing image users is expanding, and user requirements are also being advanced. In order to meet user needs, research is being actively conducted to simulate and generate remote sensing images that are limitedly acquired by various weather, environmental, and satellite operating conditions. In this issue, we deal with the research results regarding the generation of more diverse images for various environments, climates, and weather conditions, and we use them to increase the number of learning images, simulate military operations, and simulate seasonal images.

2. Image Simulation in Remote Sensing

Dae Kyo Seo and Yang Dam Eo [2] fused a panchromatic image with a SAR image to improve object recognition. By learning each class independently, the improved results were compared to existing methods. This method was designed to provide a geospatial information base without a loss of information while considering differences in the image mechanism of the two images.

Han Sae Kim and coauthors [3], in their paper, investigated kinematic in situ self-calibration to frequently re-calibrate a backpack-based MBL (Multi-Beam LiDAR) system using on-site data for handling unstable measurements of a sensor. Frequent in situ calibration prior to MBL data acquisition is an essential step in order to meet accuracy-level requirements and to implement these scanners for precise mobile applications. A simulator program was first utilized to generate simulation datasets with various observation settings, network configurations, test sites, and targets. Afterwards, self-calibration was carried out using the simulation datasets.

The high operational cost of aerial images makes it difficult to acquire periodic observations of a region of interest. Satellite imagery is an alternative for this problem and, in their article, Suhong Yoo and coworkers [4] propose a context-based approach to simulate the 10 m resolution of Sentinel-2 imagery to produce 2.5 and 5.0 m prediction images using an aerial orthoimage. This can be considered as an alternative to providing high-resolution images in a cost-effective way in the field of remote sensing

A rotational shearing interferometer has been proposed for the direct detection of extra-solar planets. This technique consists of the non-total cancellation of star radiation in order to improve signal magnitude. Beethoven Bravo-Medina and coauthors [5] propose a novel method to enhance signal magnitude by means of a star-planet interference, as well as the use of interferograms that are computationally simulated to confirm the viability of the technique.

Despite advances in SAR image processing, existing detection technologies still have limitations in boosting detection performance because of their inherently noisy characteristics. Sujin Shin and collaborators [6], in their contribution, propose a novel object detection framework that combines an unsupervised denoising network and a traditional detection network to leverage a strategy for fusing region proposals extracted from both raw SAR images and synthetically denoised SAR images.



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Changno Lee and Jaehong Oh [7], in their paper, propose sensor level mosaicking to generate a seamless image product with geometric accuracy to meet mapping requirements. The proposed method successfully identifies and removes irregular image discrepancies between adjacent data.

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