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Author: Mr. Muhammad Hasif bin Azami
LaSEINE, Kyushu Institute of Technology, Japan, azami.muhammad-hasif957@mail.kyutech.jp

Dr. Necmi Cihan Orger
Kyushu Institute of Technology, Japan, orger.necmi-cihan397@mail.kyutech.jp
Mr. Victor Schulz
LaSEINE, Kyushu Institute of Technology, Japan, schulz.victor602@mail.kyutech.jp
Prof. MENGU CHO
Kyushu Institute of Technology, Japan, cho.mengu801@mail.kyutech.jp

COFFI: AN IMAGE CLASSIFICATION GUI FOR FOREST FIRE IMAGERY APPLYING
CONVOLUTION NEURAL NETWORKS

Abstract

In the past decades, machine learning (ML) has been a powerful tool for image recognition. Any image acquired by a camera sensor or a satellite camera payload can now be rapidly classified using ML. At present, satellite imagery is being used to observe the weather and map natural disasters which occur globally, such as forest fires. On the other hand, high-resolution forest fire images from defined datasets are found to be difficult to obtain and be trained in ML models. In this study, a new forest fire dataset was collected from Doves, Sentinel-2, and Landsat-8 and were pre-trained using convolution neural networks (CNN) models to create a GUI called CoFFI: a Classification of Forest Fire Imagery GUI in order to post-processing the image downlink from satellites. Four labels (cloud, land, sea, and wildfire) were trained using the existing networks and analyzed for accuracy and computational time. The training results showed the highest accuracy of 98% with a 95% F1-score of wildfire labels utilizing the ResNet architecture. Other models were further evaluated and compared to show the effectiveness of the dataset created. Furthermore, these networks were also included in the CoFFI GUI as options to predict new images downloaded from satellites. The GUI will be fully tested and verified for images acquired from KITSUNE 6U CubeSat, which is planned to be deployed in March 2022. Ultimately, this computer program would be valuable for other satellite projects by filtering first the enormous image data downlink to the ground station before providing it to the respective authority.