Multi-Spectral Deep Learning Models for Forest Fire Detection

Authors : Smitha Haridasan, Zelalem Demissie, Atri Dutta, Ajita Rattani

Abstract : Aided by the wind, all it takes is one ember and a few minutes to create a wildfire. Wildfires are growing in frequency and size due to climate change. Wildfires and its consequences are one of the major environmental concerns. Every year, millions of hectares of forests are destroyed over the world, causing mass destruction and human casualties. Thus early detection of wildfire becomes a critical component to mitigate this threat. Many computer vision-based techniques have been proposed for the early detection of forest fire using video surveillance. Several computer vision-based methods have been proposed to predict and detect forest fires at various spectrums, namely, RGB, HSV, and YCbCr. The aim of this paper is to propose a multi-spectral deep learning model that combines information from different spectrums at intermediate layers for accurate fire detection. A heterogeneous dataset assembled from publicly available datasets is used for model training and evaluation in this study. The experimental results show that multi-spectral deep learning models could obtain an improvement of about 4.68 % over those based on a single spectrum for fire detection.

Keywords : deep learning, forest fire detection, multi-spectral learning, natural hazard detection