IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

Author: Dr. Yi Xiao
China Aerospace Science and Technology Corporation (CASC), China

Mr. Zhaoqiu Wang
China Aerospace Science and Technology Corporation (CASC), China
Mr. Aoyu Li
China Aerospace Science and Technology Corporation (CASC), China
Mr. Kaige Wang
China Aerospace Science and Technology Corporation (CASC), China
Prof. Jifeng Ma
China Aerospace Science and Technology Corporation (CASC), China
Prof. Xiaoning Zhao
China Aerospace Science and Technology Corporation (CASC), China

A UNIVERSAL REMOTE SENSING MODEL FOR TARGET RECOGNITION AND SUPER-RESOLUTION RECONSTRUCTION

Abstract

The super-resolution reconstruction task is often accompanied by the target recognition task to further clarify the target of interest in earth observation, in which the target recognition is used to provide clear textual information about the target while the super-resolution reconstruction is used to provide clear visual information for human eyes. However, existing algorithms are designed specially for target recognition or super-resolution reconstruction, lacking a universal as well as efficient method. What's more, the image resolution of the target area to be imaged is usually low, and high-resolution images are expensive and difficult to obtain. Thus it is necessary to study the method that can simultaneously handle remote sensing target recognition and super-resolution reconstruction tasks. In this study, a universal and efficient model for remote sensing target recognition and super-resolution reconstruction tasks based on CNN and Transformer is proposed. A hybrid network of CNN and Transformer is used in the model, which fully utilizes the local spatial feature extraction capability of CNN and the global feature extraction capability of Transformer. The model can be divided into the target recognition module and the super-resolution reconstruction module. The target recognition module uses the multi-scale feature extraction method to ensure that the model can recognize targets of multiple scales in remote sensing images. The super-resolution reconstruction module uses the clipsocre metric as an auxiliary constraint, which is more in line with human eye judgment. This metric can calculate the cosine similarity of spatial distance features between the generated image and the original image to make the super-resolution reconstruction results more suitable for the human eye. The whole network is deigned to be lightweight to make the model deployment more flexible and efficient. The experimental results show that the proposed universal model can handle both remote sensing target recognition and super-resolution reconstruction tasks simultaneously, and can achieve competitive results on commonly used remote sensing target recognition datasets and super-resolution reconstruction datasets.