IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Technologies, Part 1 (5)

Author: Mr. Tingwei Shu
University of Electronic Science and Technology of China(UESTC), China, 1030407536@qq.com

Prof. Dong Zhou
University of Electronic Science and Technology of China(UESTC), China, 1449608913@qq.com
Dr. Chengjun Guo
University of Electronic Science and Technology of China(UESTC), China, johnsonguo@uestc.edu.cn

APPLICATION OF IMPROVED MULTI-USER SEMANTIC COMMUNICATION TECHNOLOGY IN REMOTE SENSING IMAGE RETRIEVAL

Abstract

Semantic communication is a new type of intelligent communication, which realizes intelligent tasks and solves the problem of limited communication spectrum resources by extracting semantic information from information source and transmitting it. With the development of the Deep Learning, semantic communication has been further developed. Now, semantic communication technology has gradually applied to the Internet of Thing, UAVs, remote sensing image and other fields. There are many features in remote sensing images, such as large quantity and variety, these pose a great challenge to image retrieval. At the same time, it's difficult for multi-user image retrieval data with related sources to cooperatively perform in channel transmission. In this paper, we propose an semantic communication model to solve these problems. Firstly, we preprocessed the image, sliced the image and divided it into 1616 fixed size blocks. Compared with the general use of CNN to extract image semantic feature, Transformer structure is adopted as our semantic feature encoder and a hierarchical structure is adopted to enhance the semantic feature extraction capability of transformer encoder. We encode the simpler syntactic information in the lower-level transformer, and the more complex semantic information in the higher-level transformer. Taking advantage of the low storage and high efficiency of hashing technology, we add a hash layer behind the full-connection layer of transformer structure, and use tanh () as the activation function to generate hash codes to improve the retrieval speed. Aiming at the problem that multi-user image retrieval data is difficult to cooperatively perform, we the combine TSC decoder at the receiving terminal for joint recovery of multi-user single semantic features, and further designed a fusion module to fuse the recovered single semantic features into global features for retrieving multiple users' public identities. Finally, we carried out an experimental simulation in the RSOD dataset, and verified that our proposed method can effectively alleviate the problems existing in remote sensing image retrieval, which provides a foundation for the research of remote sensing image retrieval.