

Chapter 5

Develop a Hybrid Ensemble Transfer–Based Residual Multi–Resolution CNN for Classification of Land Cover in Remote Sensing Images

M. Suresh Anand

 <https://orcid.org/0000-0002-1055-6083>

Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, India

R. Anto Arockia Rosaline

Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, India

G. Padmapriya

Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, India

Prithi Samuel

Department of Computational Intelligence, SRM Institute of Science and Technology, Kattankulathur, India

P. Kirubanantham

Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, India

DOI: 10.4018/979-8-3693-8104-5.ch005

ABSTRACT

A reliable field covering identification from distant sensed Images is important for numerous programs, like ecological surveillance, city creation, and asset administration. Conventional approaches typically fell low in managing the intricacy and variety of distant sensed information. Present a novel method to enhance the robustness and accuracy of land cover classification through ensemble transfer-based Residual Multi-Resolution Convolutional Neural Network (RMRCNN) models. The proposed system uses the residual and multi-resolution architecture of multiple pre-trained RMRCNNs to capture multi-scale features. We train these neural networks on targeted satellite imagery sets using transfer learning, which enables the algorithms to leverage pre-learned characteristics from massive Image libraries. Using the complementing strengths of each RMRCNN and reducing its drawbacks, the ensemble method combines the output of different RMRCNNs to improve classification performance. Large tests were conducted on renowned distant recognizing information sets to assess the proposed method. This leads to suggest that the group transfer-based RMRCNN algorithms significantly surpass conventional single-model addresses and other developed methods, accomplishing greater categorization reliability, exactness, and remember. The excellent applicability of the proposed strategy over various kinds of land cover and geographical regions highlights its capacity for expansion and resilience. This study offers a viable path for further research in this area by demonstrating the effectiveness of ensemble transfer learning techniques with RMRCNN algorithms for improving surface area categorization in satellite imagery.

1. INTRODUCTION

Classifying land use using Remote Sensing (RS) images is crucial for many applications, including environmental protection, precision agriculture, urban planning, and natural resource management. High-Resolution Remote Sensing (HRRS) images have become more widely available [1]. It is now possible to acquire multi-temporal and multi-source RS images across various geographic regions. These diverse HRRS images provide detailed information about the ground, creating new opportunities for large-scale, multi-temporal modeling of land cover [2]. Advanced models are being used to tackle complex problems in RS image interpretation, such as object recognition, scene classification, image retrieval and land-cover classification [3].

24 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/develop-a-hybrid-ensemble-transfer-based-residual-multi-resolution-cnn-for-classification-of-land-cover-in-remote-sensing-images/364531

Related Content

Artificial Intelligence-Assisted Image Analysis and Clinical Applications in Urology

Halil Ibrahim Ivelikand Bekir Aras (2026). *Human-Centered AI Applications for Medical Informatics* (pp. 165-192).

www.irma-international.org/chapter/artificial-intelligence-assisted-image-analysis-and-clinical-applications-in-urology/391316

Development of Fuzzy Pattern Recognition Model for Underground Metal Mining Method Selection

Bhanu Chander Balusaand Amit Kumar Gorai (2021). *International Journal of Ambient Computing and Intelligence* (pp. 64-78).

www.irma-international.org/article/development-of-fuzzy-pattern-recognition-model-for-underground-metal-mining-method-selection/289626

Optimization Techniques in Cooperative and Distributed MAC Protocols: A Survey

Radha Subramanyam, S. Rekha, P. Nagabushanamand Sai Krishna Kondoju (2024). *International Journal of Intelligent Information Technologies* (pp. 1-23).

www.irma-international.org/article/optimization-techniques-in-cooperative-and-distributed-mac-protocols/335523

The Innovation and Transfer of Computer Science and Technology in Recent and Modern Railway Transportation

Yuanlong Yeand Hui Zhang (2025). *International Journal of Intelligent Information Technologies* (pp. 1-17).

www.irma-international.org/article/the-innovation-and-transfer-of-computer-science-and-technology-in-recent-and-modern-railway-transportation/365346

A Conceptual Security Framework for Cloud Computing Issues

Shadi A. Aljawarneh and Muneer O. Bani Yassein (2016). *International Journal of Intelligent Information Technologies* (pp. 12-24).

www.irma-international.org/article/a-conceptual-security-framework-for-cloud-computing-issues/152303