# 基于深度学习的 GF-3 双极化 SAR 大区域土地覆盖制图

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**摘要:** GF-3 是我国首颗 C 频段多极化合成孔径雷达(SAR)卫星它具有分辨率高、成像幅宽大、运行寿命长、成像模式多样等特点。本文利用 GF-3 双极化 SAR 数据实现内蒙古呼伦贝尔市大区域土地覆盖制图。得益于海量数据的获取和图形处理单元（GPU）等高性能计算资源的普及，深度学习在图像分类领域不断带给人惊喜。针对传统分类方法难以适应快速增长的业务化需求的缺点，本文以深度学习理论为基础，采用深度卷积 Highway Unit 神经网络的方法，充分发挥深度学习可有效处理海量数据的能力。分类的地物类型包括森林、草地、水域、人造地表、耕地及其他。以 2017 年 9 月采集的地面实况数据计算混淆矩阵，结果表明：基于深度学习的全卷积神经网络能够很好的抵抗噪声的影响，充分挖掘 SAR 影像在时间和空间上的规律，有效提高地物分类精度。

**关键字**：GF-3，深度学习，深度卷积 Highway Unit 神经网络，大区域土地覆盖制图

# Deep Learning for Large-Scale Land Cover Type Classification with GF-3 Dual-Pol SAR Data

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**Abstract**：GF-3 satellite is the first China C-band SAR satellites, with a variety of polarizations, 12 different working modes and a quick site access time.In this paper, the large-scale land cover type mapping of Hulunbeier is completed by using GF-3 dual-pol SAR data.Benefited

from the acquisition of massive data and the popularization of high performance computing resources such as graphics Processing Unit (GPU), deep learning has been pleasantly surprised in the field of classification. Based on the theory of deep learning, this paper uses the deep convolutional Highway Unit neural network to give full play to the ability of deep learning to effectively deal with massive data.Types of ground objects classified include forests, grasslands, waters, artificial ground, arable land and other.Calculation of confusion matrices based on ground truth measurement map collected in September 2017.The deep convolutional Highway Unit neural network by the dual-pol SAR images, the proposed approach in the paper can reduce speckle, fully excavate the regularity of SAR images in time and space and effectively improve the accuracy of classification.