

论文

基于去取向理论的全极化SAR图像模糊非监督聚类

康欣^①, 韩崇昭^①, 徐丰^②, 王英华^①

^①西安交通大学综合自动化研究所 710049 西安; ^②复旦大学波散射与遥感信息教育部重点实验室 200433 上海

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摘要

由于复杂散射体的随机取向导致其回波具有一定的波动性, 利用目标分解理论对全极化SAR图像进行分类时, 分类结果会出现一定程度的错分现象。该文提出了一种新的非监督分类算法, 该算法首先根据去取向理论, 将目标向量旋转到最小交叉极化方向; 然后, 采用u/v/H参数描述散射机制, 以模糊隶属函数代替参数平面的“硬”阈值划分; 最后, 以多元复Wishart分布描述相干矩阵, 基于Bayes极大似然分类准则进行分类。以中国广东淡水附近的L波段NASA/JPL SIR-C全极化SAR图像作为实验数据进行了仿真试验, 并进一步对聚类中心的迁移进行了讨论。试验和讨论结果表明: 同基于和类k-mean的算法比较, 该文的聚类算法对聚类效果有明显改善, 类别对应的散射机制也更为准确, 分类结果有利于地表类型的自动识别。

关键词 [合成孔径雷达](#) [去取向](#) [无监督分类](#) [模糊聚类](#) [雷达极化](#)

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Unsupervised Classification of Polarimetric SAR Image Using Deorientation Theory and Complex Wishart Distribution

Kang Xin^①, Han Chong-zhao^①, Xu Feng^②, Wang Ying-hua^①

^①Institute of Integrated Automation, Xi'an Jiaotong University, Xi'an 710049, China; ^②Key Laboratory of Wave Scattering and Remote Sensing Information, Ministry of Education, Fudan University, Shanghai 200433, China

Abstract

Scatter targets of complex terrain surfaces with random orientation product random fluctuating echoes. This leads to a confused classification by directly using target decomposition on full polarimetric SAR (PoSAR) image. To solve this problem, a new unsupervised classification method is proposed in this paper. Firstly, the target vector is transformed to the state with minimization of cross-polarization (min-x-pol); then the parameters u/v/H are used to characterized scattering mechanism, and the fuzzy membership is adopted instead of "hard" division of parameter plan; finally, characterizing the coherency matrix as multivariable complex Wishart distribution, the polarimetric SAR image is classified based on Bayes maximum likelihood criteria. Experiment is performed on a L-band NASA/JPL SIR-C polarimetric SAR image over Danshui town, Guangdong, P.R. China. Furthermore, the movements of the clustering centers are discussed. Compared with the k-mean like method based on , the results show that the proposed method provides a significant performance improvement in classification result and the associated scattering mechanism of class is more accurate. The classification result is beneficial for automatic recognition of terrain type.

Key words [Synthetic Aperture Radar \(SAR\)](#) [Deorientation](#) [Unsupervised classification](#) [Fuzzy clustering](#) [Radar polarimetry](#)

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通讯作者

作者个人主页

康欣^①; 韩崇昭^①; 徐丰^②; 王英华^①

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