Regularized Greedy Forests for Polarimetric SAR Image Classification

Conference Paper · November 2019

CITATION
1

READS
291

2 authors:

Mustafa Üstüner
Artvin Coruh Universitesi
52 PUBLICATIONS **235** CITATIONS
SEE PROFILE

Fusun Balik Sanli
Yildiz Technical University
106 PUBLICATIONS **544** CITATIONS
SEE PROFILE

Regularized Greedy Forests for Polarimetric SAR Image Classification

Mustafa Ustuner[1], Fusun Balik Sanli[1]

[1] Yildiz Technical University, Geomatic Engineering Department, 34220, Esenler, Istanbul, Turkey, (mustuner@yildiz.edu.tr ,fbalik@yildiz.edu.tr)

Abstract

SAR images are usually preferred for agricultural classification since SAR signals are sensitive to the crop structure and dielectric properties. In particular, PolSAR images provide more beneficial information for crops as they record the complete characteristics of the scattering in each polarization for the targets. The aim of this paper is to evaluate the potential of Regularized Greedy Forest (RGF) for crop classification from multi-temporal PolSAR data as well as to compare the performance of RGF with Random Forests (RF) and Support Vector Machines (SVM). For the classification of five crops (maize, potato, wheat, sunflower, and alfalfa) in the test site, polarimetric features of Cloude–Pottier decomposition were used as the input data. The Cloude-Pottier decomposition (also known as H/A/α decomposition) is an eigenvector-based decomposition of coherency matrix. The performance of RGF was compared with RF and SVM in terms of overall accuracy, kappa coefficients and computational cost. . K-fold (K=5) cross validation was used to assess the classification accuracies. Experimental results demonstrated that RGF can achieve higher accuracy (0.787 (+/- 0.035)) than RF (0.766 (+/- 0.037)) and SVM (0.738 (+/- 0.039)) for the classification of crop types. In terms of computational cost, RGF is faster than SVM and RF for the training process. Our results suggest that new generation ensemble learning algorithms such as RGF could provide many benefits in terms of accuracy and computational cost for the analysis of remote sensing data.

Keywords: *PolSAR; Regularized Greedy Forest; Polarimetric Decomposition; Agriculture; Classification*

S6.O31