Semi-Supervised Technique To Retrieve Irrigated Crops From Landsat ETM+ Imagery For Small Fields And Mixed Cropping Systems Of South Asia

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Abstract:

Precise land cover map and crop statistics are essential for monitoring and performance evaluation of any irrigation system. Remote sensing techniques are efficient means of obtaining land cover information with high accuracy in near real time. Most of such applications are coming from large tract of homogenous cropped area which may not work for highly mixed cropping systems in south asia. This paper presents a semi-supervised (hybrid) technique to map cropped area in the punjab rice-wheat and sugarcane-wheat cropping systems in rechna doab, pakistan. Two landsat etm+ images (*path 149 row 038*) of september 2001 and march 2002 were selected to represent *kharif* (2001) and *rabi* (2001/2002) seasons. A ground truth survey was conducted in different cropping areas that covered 0.14% of the total extent and geo-referenced gis coverage was prepared for image classification.
Based on principle component analysis (pca), red, nir and mir bands were selected and ndvi was added to segregate cropping area based on threshold values. Gis coverages were overlaid on a stacked image and 50% of the collected information was used to extract training signatures for all crops. The training samples were evaluated based on their location and overlap on two scatter plots between nir: red, nir: mir which yielded seven distinct crop classes. A contingency matrix was prepared based on half field information to evaluate the classification accuracy.
The results show overall accuracy of 80% in *kharif* (summer-monsoon) as well as 85% in *rabi* (winter-dry). Broad diversity in crops causes to very high spectral mixture in *kharif* resulting in comparatively lower accuracy. The present study shows how ndvi, when combined with individual band improves sensitivity and accuracy of classification.

Keywords: remote sensing, gis, crop classification, land use-land cover, spectral mixture, pattern recognition, mixed cropping system