ESTIMATING SUB-PIXEL TO REGIONAL WINTER CROP AREAS USING NEURAL NETS

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ABSTRACT:

The work aimed at testing a methodology which can be applied to low spatial resolution satellite data to assess inter-annual crop area variations on sub-pixel to regional scales. The methodology is based on the assumption that within mixed pixels land cover variations are reflected by changes in the related hyper-temporal profiles of the Normalised Difference Vegetation Index (NDVI). We evaluated if changes in the fractional winter crop coverage are reflected in changing shapes of annual NDVI profiles and can be detected by using neural networks. The neural nets were trained on reference data obtained from high resolution Landsat TM/ETM images. The proposed methodology was applied in a study region in central Italy to estimate winter crop areas between 1988 and 2002 from 1 km resolution NOAA-AVHRR profiles and additional ancillary data readily available (CORINE land cover). The accuracy of the estimates was assessed by comparison to official agricultural statistics using a bootstrap approach. The method showed promise for estimating crop area variation on sub-pixel level (cross-validated R2 between 0.7 and 0.8) to regional scales (normalized RMSE: 10%). The network based approach proved to have a significantly higher forecast capability than other methods used previously for the same study area.

TOPIC: Remote sensing applications
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