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Implementation and performance test of Machine Learning approaches for snow cover mapping in webcam image time series

Abstract

Spatial and temporal distribution of snow cover (SC) has implications in many scientific domains such as climatology, hydrology and ecology. Satellite remote sensing has frequently been used to extract spatial and temporal information on SC in contexts where low to medium resolution satellite products provide sufficient information. However, assessing implications of snow cover on vegetation at a plot scale requires data with a resolution beyond the freely available satellite products. Ground-based sensing systems like webcams may provide suitable high resolution imagery for mapping SC dynamics. Several pixel- and threshold-based approaches were developed for snow classification, but the results lack accuracy in shadowed areas and no automated solution for handling cloudy scenes is available. We present first results of webcam-based SC mapping for a high-alpine site in the Stubaier Alps (Tyrol, Austria). The performance of pixel- and threshold-based mapping of SC is compared to results obtained by employing selected Machine Learning algorithms which integrate spatial and temporal context of the image time series. Subsequently, images are rectified by monoplotting. The results will facilitate the production of fine scale maps of SC to characterize environmental conditions of high-alpine flora within the MICROCLIM project.