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Deep Learning Strategies for Mapping Complex Vegetation Patterns in Mediterranean Environments Undergoing Climate Change

Authors : Matan Cohen, Maxim Shoshany

Abstract : Climatic, topographic and geological diversity, together with frequent disturbance and recovery cycles, produce highly complex spatial patterns of trees, shrubs, dwarf shrubs and bare ground patches. Assessment of spatial and temporal variations of these life-forms patterns under climate change is of high ecological priority. Here we report on one of the first attempts to discriminate between images of three Mediterranean life-forms patterns at three densities. The development of an extensive database of orthophoto images representing these 9 pattern categories was instrumental for training and testing pre-trained and newly-trained DL models utilizing DenseNet architecture. Both models demonstrated the advantages of using Deep Learning approaches over existing spectral and spatial (pattern or texture) algorithmic methods in differentiation 9 life-form spatial mixtures categories.

Keywords : texture classification, deep learning, desert fringe ecosystems, climate change
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