Comparison of Support Vector Machines and Artificial Neural Network Classifiers in Characterizing Threatened Tree Species Using Eight Bands of WorldView-2 Imagery in Dukuduku Landscape, South Africa

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Abstract : Threatened tree species (TTS) play a significant role in ecosystem functioning and services, land use dynamics, and other socio-economic aspects. Such aspects include ecological, economic, livelihood, security-based, and well-being benefits. The development of techniques for mapping and monitoring TTS is thus critical for understanding the functioning of ecosystems. The advent of advanced imaging systems and supervised learning algorithms has provided an opportunity to classify TTS over fragmenting landscape. Recently, vegetation maps have been produced using advanced imaging systems such as WorldView-2 (WV-2) and robust classification algorithms such as support vectors machines (SVM) and artificial neural network (ANN). However, delineation of TTS in a fragmenting landscape using high resolution imagery has widely remained elusive due to the complexity of the species structure and their distribution. Therefore, the objective of the current study was to examine the utility of the advanced WV-2 data for mapping TTS in the fragmenting Dukuduku indigenous forest of South Africa using SVM and ANN classification algorithms. The results showed the robustness of the two machine learning algorithms with an overall accuracy (OA) of 77.00% (total disagreement = 23.00%) for SVM and 75.00% (total disagreement = 25.00%) for ANN using all eight bands of WV-2 (8B). This study concludes that SVM and ANN classification algorithms with WV-2 8B have the potential to classify TTS in the Dukuduku indigenous forest. This study offers relatively accurate information that is important for forest managers to make informed decisions regarding management and conservation protocols of TTS. Keywords : artificial neural network, threatened tree species, indigenous forest, support vector machines Conference Title: ICSRD 2020: International Conference on Scientific Research and Development

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