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Measures based on informational entropy applied to analysis of textural and spectral patterns of Brazilian Cerrado physiognomies

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Brazilian Cerrado is a biodiversity hotspot characterized by different physiognomies distributed along a vegetational gradient. Cerrado physiognomies are distinguished by their spatial patterns. The objective of this research has been to evaluate the complexity (in the sense of heterogeneity) of textural and spectral patterns of Cerrado phytophysiological patterns with the purpose of verifying which properties related to organization and dynamics those patterns could show. For that, images from Aster multispectral sensor were used to study Cerrado areas in conservation reserves at State of São Paulo (southeastern Brazil). Two complexity measures based on informational entropy - H/Hmax and LMC measures - were applied to physiognomy images and to the corresponding spectral response curves. H/Hmax is a measure which considers that high complexity value means that the system has more disorder. It hence enables identifying if a system is close to order or to disorder. The LMC measure provides a different interpretation considering that the highest complexity is situated between order and disorder, that is, maximum entropy is found in a state of intermediary heterogeneity. This assumption could be mathematically represented by a convex function of entropy. Results pointed out that both measures were very efficient in assigning greater values of complexity to more heterogeneous physiognomies. There was also a strong tendency that each physiognomy presents the same values of complexity at different localities, attributing a typical range of values for each one, regardless of its location.