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Task Description

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Bonn,
17. Mai 2023

Leveraging Concept Relevance Propagation to Understand The Natural Areas in Satellite Imagery

Untouched natural areas, such as wild and protected regions, play a crucial role as vital ecosystems, supporting various species and essential ecological processes. Their preservation is critical for maintaining biodiversity, mitigating climate change impacts, and the well-being of future generations. While satellite imagery and machine learning contribute to monitoring efforts, comprehending the characteristics of these areas remains challenging. In this context, explainable machine learning methods offer a promising approach to interpret these traits and uncover the underlying geo-ecological patterns. However, commonly used explainable machine learning methods often fall short of providing valid explanations for the spatial and spectral patterns observed in protected regions. This thesis aims to investigate the potential of concept relevance propagation and relevance maximization techniques in explaining the natural authenticity of protected natural areas. This research will involve developing and implementing the necessary models and methods to apply these techniques effectively. Additionally, a crucial aspect of this thesis will be the evaluation of the explanations generated by these techniques and their comparison to state-of-the-art explainable machine learning methods.

[1] R. Achtibat et al., "From 'Where' to 'What': Towards Human-Understandable Explanations through Concept Relevance Propagation." arXiv, Jun. 07, 2022. doi: 10.48550/arXiv.2206.03208.
[2] T. T. Stomberg, T. Stone, J. Leonhardt, I. Weber, and R. Roscher, "Exploring Wilderness Characteristics Using Explainable Machine Learning in Satellite Imagery." arXiv, Jul. 26, 2022. doi: 10.48550/arXiv.2203.00379.

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