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Conference Abstract

Interacting with environmental data through web applications: case studies from the Biodiversity Digital Twin

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Abstract

The Biodiversity Digital Twin (BioDT) project aims to develop a comprehensive digital representation of biodiversity, focusing primarily on terrestrial ecosystems. Through a series of prototype Digital Twins (pDTs), the project seeks to empower citizens, researchers, and policymakers to interact with complex environmental data in real-time. This work presents a case study of two pDTs developed within the BioDT initiative: the Invasive Alien Species (IAS) pDT and the Real-time Bird Monitoring (RTBM) pDT. These prototypes integrate a variety of environmental datasets, including climate data and species occurrence information, to model and simulate biodiversity patterns under different stressors and scenarios. The web applications designed for these pDTs leverage the power of R Shiny, a popular tool for building interactive web-based data visualizations. One of the primary challenges in developing these applications is handling the large, complex datasets while ensuring the user experience remains fluid and responsive. This requires an optimized data streaming system that can handle the intricate layers of data without overloading the web application's performance. Efficient design strategies for real-time data integration are therefore crucial for achieving smooth

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interaction with the environmental data, ensuring users can explore and understand biodiversity dynamics across varying spatial and temporal scales. While the full impact of these applications on public engagement and decision-making is still under development, the goal is to facilitate a deeper understanding of how stressors such as climate change or invasive species affect biodiversity. The web applications will empower citizens to explore data on species distribution and gain insights into how different environmental scenarios can shape the future of biodiversity across the continent. By providing accessible, interactive tools, the BioDT initiative aims to support informed decision-making processes related to biodiversity conservation and environmental policy.

Keywords

digital twin, web application, shiny, R, user, biodiversity

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Conflicts of interest

The authors have declared that no competing interests exist.