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Imageomics: Images as the Source of Information about Life

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Introducing the new NSF HDR DIRSE Institute Imageomics: A New Frontier of Biological Information Powered by Knowledge-Guided Machine Learning. The institute aims to establish a new field of science, imageomics: from images to biological traits using biology-structured machine learning.

Images are the most abundant, readily available source for documenting life on the planet. Ranging in resolution, scale, and subject, and coming from natural history collections, laboratory scans, field studies, camera traps, wildlife surveys, autonomous vehicles on the land, water, and in the air, tourists'cameras, citizen scientists'platforms, posts on social media, aerial surveys and high resolution satellites, there are millions of images of living organisms. But their power is yet to be harnessed for science and conservation. Even the traits of organisms cannot be readily extracted from images. The analysis of traits, the integrated products of genes and environment, is critical for biologists to predict effects of environmental change or genetic manipulation and to understand the significance of patterns in the four billion year evolutionary history of life.

Data science and machine learning can turn massive collections of images into high resolution information database about wildlife, enabling scientific inquiry, conservation, and policy decisions. I will share our vision of the new scientific field of imageomics.

Research

Education and Outreach

Data & Cyberinfrastructure

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