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Automated species monitoring from the Arctic to the tropics

With computer vision and deep learning, camera systems have become important tools to improve our understanding of species responses to environmental change. Through computer eyes, it is potentially possible to effectively, continuously, and non-invasively observe insects and other animals throughout diurnal and seasonal cycles and deep learning models can provide estimates of their abundance, biomass, and diversity. Similarly, plants can be followed locally through the flowering cycle or as they expand or contract their ranges across generations. I will unpack and visualize the rich and multidimensional data, which novel camera-based monitoring systems are capable of automatically generating. Through results from national and continental scale programs deploying sensors, I will provide a glimpse into the insights that can be derived from the images and what the future of automated species monitoring might look like. I will also highlight some of the outstanding challenges and future research avenues to facilitate the broad scale implementation of camera-based monitoring for plants and insects across scales.