

Data science for modern ecological surveys: a pathway towards synthesising data from multiple sensor streams for continuous monitoring and inference

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In recent decades, the field of ecology has been revolutionised by sophisticated monitoring devices that are capable of collecting data like never before. On wildlife surveys, we can detect animals using camera traps, microphones, or hydrophones. We can also measure spatial variables at landscape scales: satellite imagery can provide a rich source of environmental data, allowing us to understand, explain, and predict important ecological processes such as distribution, density, and movement.

But what to do with all the data? We have advanced data-processing and modelling methods at our disposal, but they can be time-consuming to use, and often exist in their own bubbles. An ecologist might need to use separate pieces of software to (1) extract detections of animals from video- or audio-streams; (2) determine the species, or even identify the individual animal; (3) extract spatial data from satellite imagery; (4) wrangle and interpolate the spatial data; and (5) fit models to conduct statistical inference.

In this talk, I will describe some recent research projects that have relied this sort of bits-and-pieces approach, highlighting both the huge benefits we get from combining data collected by a variety of sophisticated devices, but also the challenges. I will discuss ongoing and future work into creating data-processing and modelling pipelines that are capable of reporting meaningful answers in real time.