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Grande salle + visioconférence

EXPLORING THE WEB OF DARK INTERACTIONS

par

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- In this talk I will discuss why we need automated methods to reconstruct ecological networks and why it is necessary to go beyond the trophic relationships (food webs) that are most commonly studied. In part this is because we want to increase the representativity of the networks that exist, by reconstructing webs of systems that are often difficult to study, such as microbial networks. In part it is to increase the replication of the networks that we already have. And, in part it is to contribute to the monitoring of the Earth's ecosystems.
- We built a pipeline in R, called InfIntE, to take environmental DNA sample data from metabarcoding amplicon sequence variants (ASVs), which can be treated as taxa, automatically all the way through to learning ecological networks that display a number of different types of ecological interactions. Some of the interactions, such as the trophic relationships resolved in food webs are visible and well understood, while competition, amensal and commensal interactions are 'dark' and not normally visible to scientists. InfIntE uses logic-based machine learning. This process of inferring interactions is direct – the algorithm indicates that an interaction has likely occurred and is of a particular type - based upon rules or hypotheses that describe how an interaction should change the abundance of any two taxa undergoing the interaction, represented in the eDNA samples as the sequencing depth (counts) of the ASVs. This process differs from the statistical inference that is commonly used for which some user-interpretation of the importance and type of interaction is necessary. I'll detail the scientific benefits of logic-based approaches to reconstruction and the ecological knowledge that we could gain from rich ecological networks of interaction. I'll illustrate this with networks from microbial (leaf microbiome) and macrobial (invertebrate food web) ecology from agriculture. I'll also discuss the ongoing problems with the methodology and the approaches we are taking to validate the networks, in the hope of convincing scientists that logic-based approaches can build 'real' ecological networks that have scientific veracity.

Exposé en anglais.

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