Disentangling environmental effects in microbial association networks

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Abstract

Though tiny, microorganisms and their interactions play a big role in how ecosystems operate. But despite abundant data, these interactions remain largely a mystery. Now, a computational tool called EnDED could help scientists identify key associations, and, more importantly, eliminate false associations that could provoke misleading interpretations of data. EnDED, short for Environmentally Driven Edge Detection, predicts indirect edges, which are simply environmentally driven. For example, different kinds of microorganisms can coincide in certain areas and seasons, but it's likely an environmental factor (like temperature) that brings them together and not a causal relationship. EnDED uses up to four algorithms to prune misleading connections due solely to environmental factors. EnDED uses up to four algorithms to prune misleading connections due solely to environmental factors. EnDED uses up to four algorithms to prune misleading connections due solely to environmental factors. EnDED uses up to four algorithms to prune misleading connections due solely to environmental factors. When applied to a marine microbial network constructed from ten years of microbial abundance data. The intersection of all 4 methods predicted that more than 8% of associations were environmentally driven. with the fraction of environmentally driven edges describing negative microbial associations increasing rapidly with the number of environmental factors considered. Applying this 4-in-1 tool to other networks could help reduce the number of false associations that tend to arise and help scientists reach more accurate hypotheses about ecological interactions.