Detecting the ultra low dimensionality of real networks

M. Ángeles Serrano

Universitat De Barcelona, , Spain, [2]ICREA, ,

Reducing dimension redundancy to find simplifying patterns in high-dimensional datasets and complex networks has become a major endeavor in many scientific fields. However, detecting the dimensionality of their latent space is challenging but necessary to generate efficient embeddings to be used in a multitude of downstream tasks. We have introduced models and methods to infer the dimensionality of real networks based on the ability of hyperbolic geometry to capture their complex connectivity. Our analysis has revealed ultra low dimensionality as an ubiquitous feature, and unexpected regularities across different domains, including extremely low dimensionality in tissue-specific biomolecular networks, close-to-three-dimensional brain connectomes, and slightly higher dimensionality in social networks and the Internet.