

On the Limits of Network Science

Keywords: philosophy of science, epistemology, modeling, predictability, causality

Extended Abstract

It is evident that science has limits, given the plethora of phenomena we do not understand. Nevertheless, it would be interesting to estimate which of these limits are temporal (eventually we will go beyond them) and which ones are inherent (we will never know). More pragmatically, a systematic classification of the limits of science would allow us to measure our current abilities, avoid projects doomed to fail, identify potential research programs, and alternatives for limits that seem to be unsurpassable.

In this context, it would be relevant to study at least the limits of predictability, computability, classifiability, optimizability, formality, causality, objectivity, measurability, replicability, modeling, and interpretability.

There are two complementary questions worth exploring: what are the particular implications of the limits of science in general for network science? And, what can network science inform us about the limits of science?

Related to the first question, we can explore the validity of different methods for building causal networks [1], the reliability of current network reconstruction approaches [2], the implications of the inherent subjectivity of networks [3], and more.

Related to the second question, we can explore how does the predictability [4, 5] or classifiability [6] of a system changes with its connectivity or topology, how the structure of a system can alter the replicability of its dynamics, and more.

So far, we have many questions and only a few answers. Still, we have to start with something. And a broad community is required to address these challenges.

References

Removed for blind review