

Trace Complexity of Network Reconstruction

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The network inference problem consists of reconstructing the edge set of a network given traces representing the chronology of infection times as epidemics spread through the network. This problem is a paradigmatic representative of prediction tasks in machine learning that require deducing a latent structure from observed patterns of activity in a network, which often require an unrealistically large number of resources (e.g., amount of available data, or computational time). A fundamental question is to understand which properties we can predict with a reasonable degree of accuracy with the available resources, and which we cannot. We will define the trace complexity as the number of distinct traces required to achieve high fidelity in reconstructing the topology of the unobserved network or of some of its properties.

We will present some existing trace complexity results, and a number of open problems.