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Vasu N Chetty* (chettyv@byu.edu). *Identification of dynamical structure functions: a systems theoretic approach to network reconstruction.*

Linear systems theory details different mathematical representations of systems which define the same behavior, but different notions of structure. For example, the transfer function, which captures the input-output behavior of a system with little structural information, and the state space representation, which captures all structural information. Thus, reconstruction of a system is representation-dependent. Network reconstruction of any representation beyond the transfer function is ill-posed, meaning that a priori information is required in order to determine the internal structure. The minimum amount of information required to ensure well-posedness is known as the cost of reconstruction.

Although the state space representation of a system contains more structural information about a system than its transfer function, the associated cost of reconstruction is very high. Many algorithms attempt to avoid this cost by making assumptions about the system that may not always be reasonable, such as parsimony. In this work, we discuss the dynamical structure function, which is a partial structure representation of a system that contains more structural information than a system's transfer function and has a lower cost of reconstruction than the state space representation. (Received February 16, 2016)