

## Public Abstract

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Many emerging data processing problems concern redundant information. In some applications redundancy is designed into a system to protect against corruption of the data due to noise or data loss. In other situations we may have an existing system (a sensor network for example) in which an individual state is measured from multiple perspectives. In this scenario, it is desirable to somehow characterize the redundancy of the given measurements.

We consider problems related to each of these issues. With regard to system construction, we develop a new method for building some of the most general types of redundant systems while controlling many geometric or reconstruction properties of these systems. This control is critical for applications as the construction can yield systems resilient to noise or data loss.

For an existing system, we investigate a new method for describing redundancy. We accomplish this by carefully partitioning systems and choosing subsets which are optimally redundant in some sense. This allows us to explicitly describe the redundancy in the system. A more fundamental understanding of such redundancy in linear systems is a first step to many potential advancements in signal processing.