Title: Information and Coding

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Abstract: Coding theory is an art of rewriting symbolic messages to achieve data compression, error correction or encryption. In this RTG sequence data compression and error correction will be introduced. The mathematics involved is a mixture of probability, finite fields and discrete math.

In the first lecture symbol and block codes will be defined and their application to data compression will be explained and illustrated with selected examples. Kraft inequality and Shannon-Fano theorem will be formulated. As an example, I will compress one of Shakespeare's plays and a digital image.

In the second lecture, the focus will be on error correcting codes. It will be explained how finite fields are used to build Reed-Solomon codes. The decoding problem will be formulated and the Berlekamp-Massey algorithm for efficiently decoding Reed-Solomon codes will be outlined. Several applications will be discussed, such as protecting data on your computer with RAID (Redundant Array of Inexpensive Disks).