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Codes, Capacities and Covering Arrays

Let $\mathcal{B}$ be an alphabet and suppose that there is a set of noisy channels on symbol sets $\mathcal{B}$. We will associate a family of graphs, $\mathcal{G}$ with the channels: if $(x, y) \in E(G)$ for $G \in \mathcal{G}$ then in the channel associated to G, the letters x and y are distinguishable with positive probability. There is a corresponding notion when the graphs are directed. If we are given such a family of noisy channels, what is the best code to use if we do not know which precise channel we will get. The answer is to find a largest possible set of sequences where each pair is distinguishable in any given channel for at least one of their indices. In the directed graph case this code corresponds to a covering array which is an object that generalizes orthogonal arrays and is more typically encountered in software engineering and reliability testing. This talk does not present any new results but surveys this interesting connection.