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Global Testing for Dependent Bernoullis

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Via Zoom (session information will be e-mailed to subscribers)

ABSTRACT

Suppose $(X_1,\ldots,X_n)$ are independent Bernoulli random variables with $\mathbb{E}(X_i)= p_i$, and we want to test the global null hypothesis that $p_i=\frac{1}{2}$ for all i, versus the alternative that there is a sparse set of size s on which $p_i\ge \frac{1}{2}+A$. The detection boundary of this test in terms of (s,A) is well understood, both in the case when the signal is arbitrary, and when the signal is present in a segment.

We study the above questions when the Bernoullis are dependent, and the dependence is modeled by a graphical model (Ising model). In this case, contrary to what typically happens, dependence can allow detection of smaller signals than the independent case. This phenomenon happens over a wide range of graphs, for both arbitrary signals and segment signals.

This talk is based on joint work with Nabarun Deb, Rajarshi Mukherjee, and Ming Yuan.