JEANETTE JANSSEN, Dalhousie University

Reconstructing the linear order of a locally connected random graph

Consider the following random graph process. Vertices are sampled from the interval $[0,1]$. Pairs of vertices are then connected (conditionally) independently with probability depending on their distance. Precisely, there is a decreasing function $f:[0,1]\to[0,1]$, the probability link function, and for a pair of vertices $x,y\in[0,1]$, the connection probability is $f(|x-y|)$. Since vertices are embedded in the line segment, they have a natural ordering. Vertices that are closer to each other in the order are more likely to be connected; thus most connections are local.

The problem we consider is that of retrieving this order from the sampled graph; this may be referred to as graph seriation. We present a randomized graph seriation algorithm that, for a large class of probability functions, yields an ordering with error $O^*(\sqrt{n})$ with high probability; we also show that this is the best-possible convergence rate for a large class of algorithms and proof strategies. Under an additional assumption on the probability function, we obtain the vastly better rate $O^*(n^\epsilon)$ for any $\epsilon>0$.

This is joint work with Aaron Smith.