Minisymposium 19 - Random Discrete Structures and Algorithms

Adversarial mixing in virtual space

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In this talk I will study the problem of how to keep honest and adversarial nodes well-spread in a virtual space. More precisely, I will be focusing on the space [0,1) of real numbers. At any time, every node in the system is assigned to some point in that space, and nodes may join or leave the system as they like. The problem is to find simple and efficient join and leave protocols for the nodes that are oblivious to their state yet can preserve the property that, given n nodes in the system, the following conditions are met: For any interval I of size $(c \log n)/n$, where c is a sufficiently large constant,

- I contains $\Theta(|I| \cdot n)$ nodes, and
- the honest nodes in I are in the majority.

First, I consider the case that the adversary can only issue adaptive join/leave requests for adversarial nodes and then the case that the adversary can issue adaptive join/leave requests for all nodes. For both cases, simple join and leave protocols can be constructed that preserve the conditions above, with high probability. This has interesting applications for peer-to-peer systems.