
SUBHASH SURI, University of California, Santa Barbara, USA

Detecting Cuts in Sensor Networks

We investigate a geometric problem motivated by sensor networks, which have emerged as a model for ubiquitous computing and monitoring of the physical world. If sensor networks are to act as our remote “eyes and ears”, then we need to ensure that any significant failure (natural or adversarial) suffered by the network is promptly and efficiently detected.

In this talk we will consider a concrete problem of detecting linear cuts that isolate at least ϵ fraction of the nodes from the base station. We show that the base station can detect whenever an ϵ -cut occurs by monitoring the status of just $O(1/\epsilon)$ nodes in the network. Our scheme is deterministic and it is free of false positives: no reported cut has size smaller than $\epsilon n/2$. Besides this combinatorial result, we also propose efficient algorithms for finding the $O(1/\epsilon)$ nodes that should act as *sentinels*, and report on our simulation results, comparing the sentinel algorithm with two natural schemes based on sampling.

This is joint work with Nisheeth Shrivastava and Csaba Toth.