Statistical Cluster Detection and Pervasive Surveillance of Nuclear Materials Using Mobile Sensors

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January 23, 2009

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Abstract

Pervasive surveillance and monitoring provides an effective way to protect against terrorist attack by illicit nuclear materials . The advancement of technology makes nuclear detection devices both inexpensive and portable, while the GPS (Global Positioning System) is becoming commonly available. It is feasible for mass productions and installations of such devices on taxi cabs, police vehicles, fire trucks, and public transit systems in major U.S. cities. In this paper we propose nuclear signal models and sensor detection models. We use spatial multi-cluster classification methods in statistics to analyze the signals from the proposed sensor network. For illustration, we conduct a simulation study for cluster detection based on several practical scenarios.