



## MGT: Algorithms for identifying explosives in a crowd with distributed sensors

- Approach:  $N$  individuals walking in a random pattern
  - Small number  $k$  carrying explosive materials
- Distributed trace sensors can detect presence of explosives in close-in area
  - But multiple individuals present
  - Exploit motion diversity to isolate individuals with explosives
- Analysis questions:
  - Time required to identify individuals carrying explosives?
  - Effect of sensor range?
  - Effect of number of sensors?

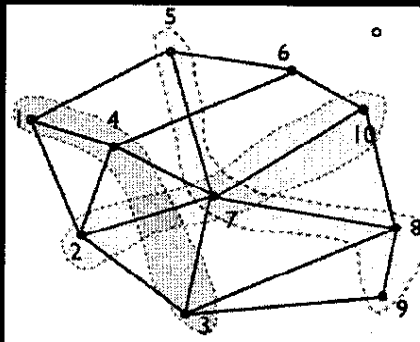
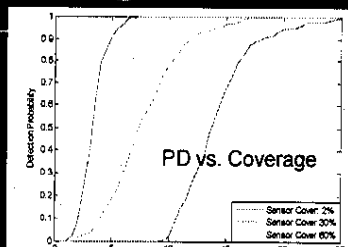


Illustration of Individuals walking around in a mall. Red circles denote locations of sensors. Goal is to identify individuals that pose an enhanced threat

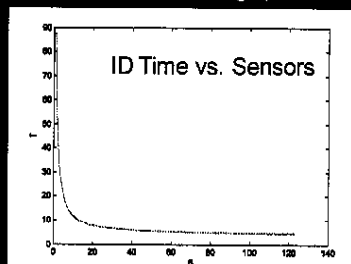


## Results: Markov Group Testing

- Design problem: choose # deployed sensors
  - Compute ID time to identify persons with explosives
- Example
  - 200 individuals, 3 with suspicious material
  - One centrally-located sensor testing groups every 30 seconds
  - Results: after 6.5 minutes, can ID persons carrying suspicious material with 99% guarantee
  - More sensors reduce time required



Performance dependence on number of sensors as well as range per sensor



Time to isolate individuals with suspicious materials identifies architectural trades