Algorithm Development for Security Applications (ADSA)
Workshop 6:

Development of Fused Explosive Detection Equipment with Specific Application to Advanced Imaging Technology

Adaptive Screening

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Conclusions

- Assume that passengers have different a priori probabilities of transporting an explosive.
- Assume that threats will continue to evolve, increase, thus they may not be equally weighted
- PD maximized and PFA minimized by taking first two bullets into account by:
  - Increased PD and increase PFA for passengers with higher risk
  - PD /passenger includes scanning for more types of explosives and with lower mass
- Maximizes performance given limited resources (scanners, operators, time)
- Need to develop methods to
  - Associate risk per passenger, per threat, per time period
  - Adapt screening based on risk
  - Quantify results of using adaptive screening
- Use of adaptive screening is a policy decision
  - Policy is outside of scope
- Material is not based on TSA programs with similar names

Screening Today and Future (USA)

- Same screening protocol applied to passengers and divested objects
- Future detection requirements
  - New threats
  - Lower mass
  - Higher PD, lower PFA
- No silver bullet – no single technology will meet future detection requirements
- Fusion may solve this problem
  - Adaptive screening is a type of fusion

What is Adaptive Screening?

- Flexibility to optimize screening based on external triggers
  - dynamically select screening procedures
  - dynamically configure scanners to engage specific scan parameters or detection algorithms
- Limits
  - Trusted traveler - normal PD and nominal threat list at nominal PFA
  - Known terrorist – high PD and larger threat list at high PFA
- Can be automated or manual

Examples

- Not Adaptive
  - All people and divested objects are treated the same way
- Adaptive
  - A scanner selects data acquisition parameters or detection algorithms based on external triggers.
  - Trusted traveler screening with nominal scrutiny
  - Selectees are screened with additional scrutiny.

Risk Association

- General threat level
- Intelligence on
  - Specific people
  - Threat
- Profiling
- Human observation (BDO)
- Biometrics
- Anomaly detection

Developmental Needs

- Methods to
  - Associate risk
  - Communicate risk
  - Use risk
- Prove use of risk is important
  - Affect policy decisions

System Changes and Testing Support

- Vendor provides multiple ATRs or knobs to
  - Increase PD at expense of PFA
  - Control which set of explosives to detect
  - Decrease minimum mass at possible expense of increased PFA
- Test different versions of ATR
  - Could be done virtually by running saved data
- Limit
  - Test segmentation and feature extraction functionality
  - TBD group writes detection/classifier
  - TSA specifies configuration file for detection/classification

Other Topics

- Deterrence
  - Random selection of protocols
- Avoidance of civil liberty issues

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