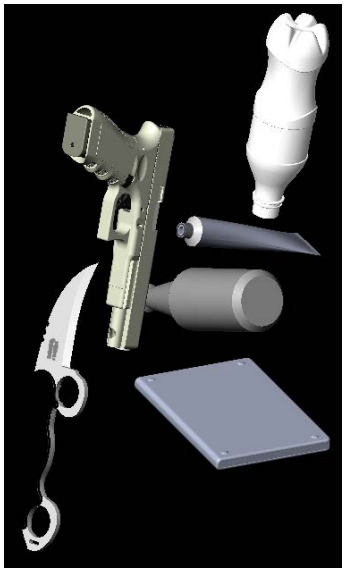
TiaLinx, Inc.

Threat Detection Solutions

TiaLinx, Inc.

- TiaLinx's unique 3D-CNN with recursive error minimization algorithm can be applied to detect threats at check points with any morphology
  - Our 3D-CNN detects material property and morphology.
  - Training database is generated by our 3D content generator.
- Accuracies are superior to the human's detection capability
  - Potential of 20% enhanced detection accuracy to the base with 6% enhanced prediction for 3D vs. 2D images and only hundreds of training images.
- Recalls are reduced and queue can be shortened substantially
  - Using 3D-CNN with high-end processing is estimated to enable more than 1800 luggage to be screened hourly.



We need funding to provide an integrated solution!

Contacts

Fred Mohamadi, Ph.D.
Founder & CEO
fm@TiaLinx.com
(949) 285-6255

TiaLinx, Inc.

- TiaLinx is a small business corporation that provides state-of-the-art threat detection and surveillance systems since 2003.
- The Company has launched 12 millimeter wave (MM-Wave) products for surveillance and protection of high impact assets and has generated 80 US patents.
- For the past two years we have focused on discrimination of suspicious contents in luggage by using Neural Networks algorithms. Our study indicates feasibility of enhanced detection of threats by more than 20% to the current base.
- Accuracies of detecting threats with 97% or more, reduces risk of undetected threats and recall.
- It is expected that screening time be reduced to the fraction of current time leading to shorter queues, and save the TSA tens of millions of dollars annually.

TiaLinx's NN based EDS

TiaLinx, Inc.

- Classifications: (1) plastics, (2) liquids, (3) explosives

Output Class	1	2	3	Total
1	45.50%	0.00%	0.00%	100.00%
2	0.00%	18.20%	0.00%	100.00%
3	0.00%	0.00%	36.30%	100.00%
Total	100.00%	100.00%	100.00%	100.00%

Target Class

Signal processing of highly isolated detectors, and high linearity of quantization enable more accurate predictions.

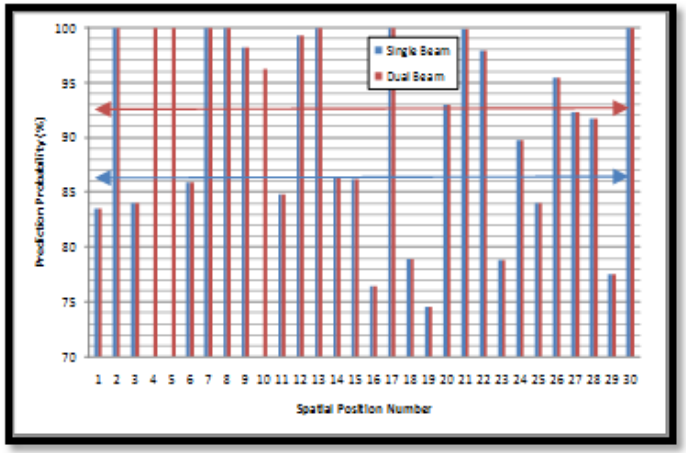
Challenge 1: TSA & Vendors' reluctances to share data
Challenge 2: ITAR restrictions prevents absorbing many talents

CNNs Spatial Image Prediction

TiaLinx, Inc.

- Spatial Imaging provides substantial enhancement in threat prediction:
  - We have observed 86% vs. 92% accuracy of prediction for 2-D vs. 3-D, respectively.
  - Training by using patches have resulted in 5% additional improvement in accuracy of predicting knives and guns compared to the full images only.

(a) Rotation Images

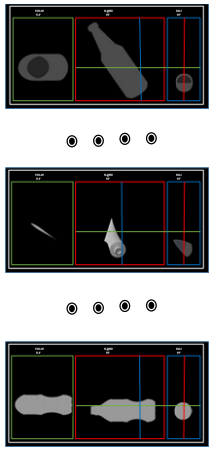


(b) Prediction Probability

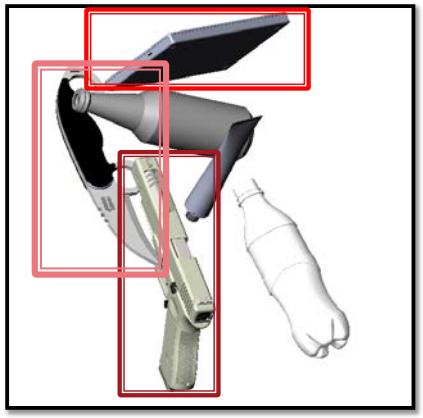
Spatial Image Reconstruction

TiaLinx, Inc.

- Data is generated by simulating composites of threats and benign objects
- Prioritization to detect threat is based on assigned labels
- Computer generated multi-layer CT scans are stored in the image repository for classification
- Part of the algorithm can also be used for dual beam systems with additional front-end image filtering (segmentation).



© TiaLinx, Inc.



Labeling material property of objects to their morphology is a crucial step to accurately predict threats.

Current Status and Next Steps

TiaLinx, Inc.

- Partial images (patches) can be used to enhance the prediction accuracy.
- Tagging each object's material and morphology provides more accurate prediction. This is a crucial step for threat detection of objects with amorphous patterns (paste in any shape) .
- High resolution pre-trained data provides better prediction of morphology at the expense of processing cost.
- Multi-dimension CNN is an essential tool for accurate threat detection.
- Future efforts should address regions of interest (ROI) to present the threat visually.