Deep Learning Technical Interchange

The Transportation Security Administration (TSA) held a Deep Learning Technical Interchange in the fourth quarter of FY17. The two-day interchange featured multiple technologies developed with funding from the Department of Homeland Security Science and Technology Directorate (S&T) Checked Baggage Program. Research developed under BAA 13-05, Advanced X-Ray Material Discrimination, addresses widely known technical limitations with new approaches and novel methodologies from both academia and the threat detection industry. Smiths Detection and Rapiscan were two of the performers attending the Technical Interchange, presenting results that were gathered, in part, through their partnerships with S&T.

The two-day interchange provided a glimpse of the future foundation of basic research and deliverables from the Checked Baggage Program Office. "S&T and TSA are investing in partnerships toward a single goal: the betterment of the Aviation Security Enterprise," said Sharene Young, Checked Baggage Program Manager. "There will be more innovation to come as we continue to support the goals of our primary customer, the TSA."

Leveraging R&D Across Partnerships

Examples of the knowledge gained and leveraged with regard to Deep and Machine Learning:

- The University of Arizona (UA) was at the forefront of "Deep Learning" discovery. Much of their research for BAA 13-05 was identifying the value of the data. Refining the detailed information provided by the data and discovering whether a true threat has been detected is key to reducing false alarms and improving overall detection capability. Through 3D modeling and simulation, and validation by actual data sets, the path to the solution was simplified.

- Telesecurity Sciences was able to utilize knowledge gained by UA and couple it with their third-party algorithm approach, which yielded significant initial improvements in detection and reduction of false alarms in several threat areas.

- Applied Quantum Technologies (AQT) partnered with Smiths Detection and was able to use the discoveries made by UA, coupled with the algorithm improvements from Telesecurity Sciences, to develop a secondary screening tool. The tool can be used with any Checked Bag or Checkpoint System to resolve false alarms, thereby improving the overall detection capability.
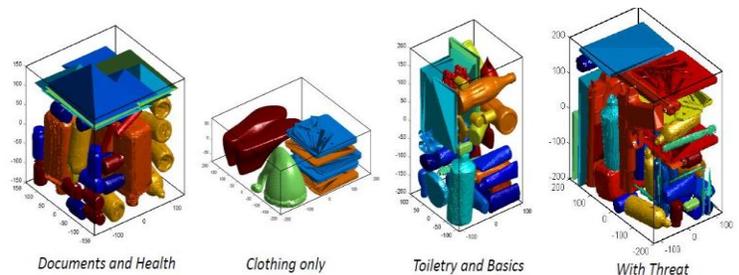
University of Arizona created a novel stochastic bag generator, which allows for performers to create randomized bags from an item list to supplement the lack of actual data used for testing.

Technology Transitions for a Secure Future

The transition of knowledge is an important commodity in the research and development arena. The technologies developed and showcased in the Deep Learning Technical Interchange will significantly inform the next generation of detection tools being transitioned for use by the TSA. BAA 13-05 is currently winding down, and follow-on efforts were awarded in BAA 17-03. S&T's Checked Baggage Program continues to transition knowledge through robust R&D efforts in order to ensure safe travel within the Aviation Security Enterprise.