IntelliScience

IntelliScience@ Work

TSA Trial: Liquid Detection Study

Premise

In concert with the Idaho Department of Homeland Security, IntelliScience proved its ability to quickly identify and discriminate liquids within carry on baggage using CT technology. The capability has significant implications in Homeland Security, Defense and commercial transport applications.

Scenario

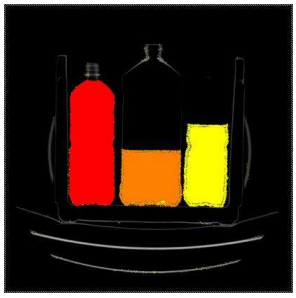
IntelliScience and DHS-Idaho cooperated to conduct scans of known liquids at Boise Air Terminal to create a known knowledge set of liquids for study. Device provider would not release images, requiring IntelliScience to recreate the study at a Boise medical facility.

- CTX parameters: 180 keV, 15 mA-s
- Scanned on Toshiba Aquilion quad slice with 135 keV, 50 mAs, (100 mAs at 0.5 second rotation) 5.5 pitch (medical scanners do not provide 180 keV)
- DICOM output converted to tif format with variety of window and level combinations

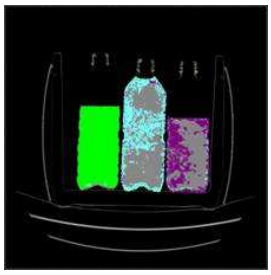
IntelliScience Actions

- Knowledge set (control data) trained less than 40 times using IntelliScience software
- Target items were then placed in 3-4 oz bottles and placed in carry on baggage with other items and in various orientations. (See Figure 1 below)
- Less than 2 seconds analysis time per test image using laptop computer.

Figure 1



IntelliScience trained liquids include (L to R) 35% Hydrogen Peroxide, 70% Isopropyl Alcohol, Castor Oil, Shampoo, Water, Wine.



IntelliScience was able to quickly detect and distinguish liquids placed in carry on bags. Wine (in image on right) was counted as a negative due to large amount of water identified.

Conclusion

IntelliScience software was able to correctly identify 15 of 16 target items from the test imagery based on less than 40 trainings of a known knowledge set. Further trainings will increase precision and discrimination. Additionally, the CT parameters used in the medical facility use less "power" than those used by non-human scanning devices. IntelliScience software works with any type of data to quickly and accurately identify unknowns by creating patterns of data using low computational power. This study demonstrates the impact that IntelliScience software can have in automated target recognition applications - reducing time and cost while improving the end-user experience.