

Toward Automatic Threat Recognition for Airport X-ray Baggage Screening with Deep Convolutional Object Detection

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For the safety of the traveling public, the Transportation Security Administration (TSA) operates security checkpoints at airports in the United States, seeking to keep dangerous items off airplanes. At these checkpoints, the TSA employs a fleet of X-ray scanners, such as the Rapiscan 620DV, so Transportation Security Officers (TSOs) can inspect the contents of carry-on possessions. However, identifying and locating all potential threats can be a challenging task. As a result, the TSA has taken a recent interest in deep learning-based automated detection algorithms that can assist TSOs. In a collaboration funded by the TSA, we collected a sizable new dataset of X-ray scans with a diverse set of threats in a wide array of contexts, trained several deep convolutional object detection models, and integrated such models into the Rapiscan 620DV, resulting in functional prototypes capable of operating in real time. We show performance of our models on held-out evaluation sets, analyze several design parameters, and demonstrate the potential of such systems for automated detection of threats that can be found in airports.