Using a Neural Network to Detect Threats Inside of TSA Images

Antonio, Nikolos (School: Timberland High School)

TSA screened more than 708 million passengers in 2015 (more than 1.9 million per day), which is 40.7 million more passengers than in 2014. A neural network is a form of machine learning that learns from examples. It will learn on labeled datasets for objects that are labeled “threat” or “no threat” Other projects, such as AlexNet, and GoogleNet, have been designed to classify many different labels inside of millions of images and their structure and design could help classify images for security. The overall goal is to create a program that can identify where threats are in a TSA based image inside of 17 different body areas. To prepare the data mean value subtraction was done on the images, removing the mean pixel amount to give a more uniform image to train upon. When training, the models where both trained with and without an autoencoder to compare results. The auto-encoder is a means of unsupervised feature learning so that It can copy it’s input as an output. It does this to approximate upon the training data so it can learn upon new data when it has been shown unknown data to learn upon. With the number of people going through TSA everyday it is important to try and automate the screening process to improve safety.

Awards Won: