



Explosion Detection using Transfer Learning via YAMNet

Samuel Kei Takazawa¹, Milton Garces¹, Luis Ocampo Giraldo², Jay Hix²,

David Chichester², Cleat Zeiler³

Advisor: Milton Garces

¹University of Hawaii at Manoa, ²Idaho National Laboratory, ³Nevada National Security Site

takazaw4@hawaii.edu

Abstract:

The prompt detection of explosions is a vital part of nuclear non-proliferation monitoring. A method to achieve this prompt detection, is to use a mobile phone array installed with a trained machine learning model specializing in explosion detection bringing the computations to the edge. To make such a model, we applied transfer learning methods using Yet Another Mobile Network (YAMNet) and ~200 acoustic explosion data collected on smartphones. The explosion data was collected in collaboration with INL and NNSA over a two-year period with data ranging in yield from 7 grams to 1.8 kilotons TNT equivalent yield over a distance ranging from 160 meters to 140 kilometers. The model performed with 90% accuracy with false positive rate of 3% using a test data set with explosion data and ambient noise data collected from the same smartphones. The models will be further tested with other environmental signals and their accuracies will be broken down by scaled distances.