

Report Date: 10/28/2022

To: ematson@purdue.edu, ahsmith@purdue.edu and lee3450@purdue.edu

From: SharpShooter

- Donghyeon Na (201721402@sangmyung.kr)
- Hansu Jeong (201710982@sangmyung.kr)
- Minjae Kim (kmj5596@khu.ac.kr)
- Jeongwon Moon (bella7365@knu.ac.kr)
- Woojin Choi (twinsno119@sunmoon.ac.kr)

Summary

A test conducted with 1km had succeeded. Team Sharpshooter created a list of predicted Q&A that might possibly be asked.

What Sharpshooter completed this week:

- Conducted a second outdoor test
LoRa test implemented outdoor. LoRa transmission succeeded at the distance of 1km. The experiment was conducted at 10.23.22 4PM (Temperature: 26 °C, Humidity: 44%, Wind: 6m/s)

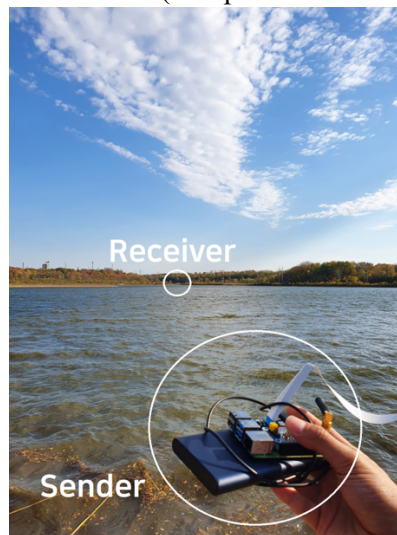


Fig. 1. Conducting LoRa communications outdoor

- Pre-processed the sound data
Audio dataset was preprocessed to have a sampling rate of 44,100 Hz and 1 audio channel. The preprocessed dataset was converted into a spectrogram. For model training and evaluation, dataset was split into train data and test data.
- Classified gun sounds by using CNN
Model hyperparameters were used the following options. Optimizer : Stochastic Gradient Descent (SGD), Learning Rate : 0.001, Activation Function : ReLU, and Loss Function : Cross Entropy Loss. The number of model parameters 11K. Model accuracy is 98.7%.

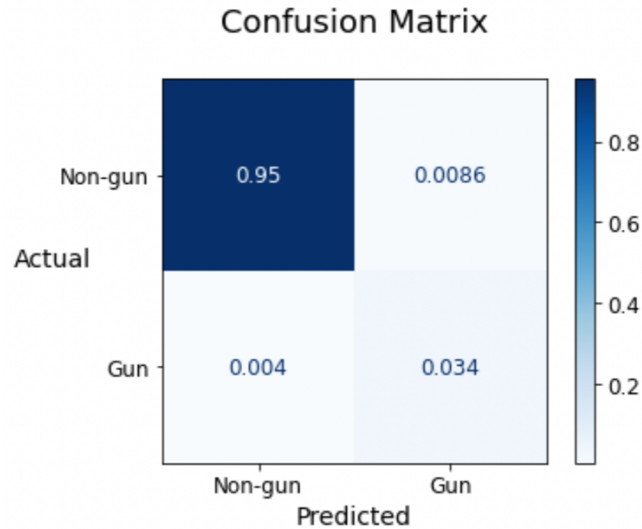


Fig. 2. CNN confusion matrix

- Prepared mid-presentation

Things to do by next week

- Augment the data to prevent overfitting in sound classification
- Perform perspective transformation after taking an initial target image with Raspberry Pi camera

Problems or challenges:

- The image was taken with a cell phone. This part will be changed to Raspberry Pi Camera. To obtain a suitable target, the target must be fully adhered.

References

[1] Z. Razak, N. J. Ibrahim, E. M. Tamil, M. Y. I. Idris and Z. B. M. Yusoff. "Quranic Verse Recitation Feature Extraction using Mel-Frequency Cepstral Coefficient (MFCC)," in *4th International Colloquium on Signal Processing and its Applications*, Kuala Lumpur, Malaysia, 2008.