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Summary

The CNN model accuracy improved. The visualization team finished setting the connection of the WebSocket between React and Node.js. IoT team succeeded executing the sound model in Raspberry Pi and started to refactor the code to fit the product.

What Sharpshooter completed this week:

- Improved the CNN model performance
  Hyper-parameters are adjusted to increase the accuracy of the model. So far, when SGD was used as the optimizer and ELU was used as the activation function, the highest accuracy and F1 score were obtained. Model hyperparameters were used as the following options. (Optimizer: Stochastic Gradient Descent (SGD), Learning Rate: 0.001, Activation Function : ELU)

	Condition	Test Accuracy	Test F1 Score
1	ReLU	97.596	97.244
2	ELU	98.138	97.855
3	BatchNorm + ReLU	97.901	97.589

Table. 1. CNN Test Accuracy and F1Score

- Set initial stage for WebSocket in React
  Sharpshooter finished the initial setting on the Client side and the initial Socket transmission between the Node.js server and React server.

- Succeeded to execute the sound model in the Raspberry Pi
  In the Raspberry Pi 4B 8GB, there were 2 issues. The first was Python Library Dependency issue. In CoLaboratory, the development environment of google, the sound model was executed well, however, in the Raspberry Pi, the sound model wasn't executed.
  The Second was Python version issue. In the development environment of Raspberry Pi, it used a Python version 3.9. The Python version 3.9 generated an error about CPU. To solve above 2 things, Python version and Python library version were matched to the same one as CoLaboratory.

- Started to refactor the Raspberry Pi code to fit the product
  Until now, the code was for testing. From now, the code will become the product.

- Started to write the method section of paper

Things to do by next week
- Complete the sound classification part
- Visit Tony's farm to test the sound classification model and target detect system.

Problems or challenges:
- Packet loss is a concern when image communication using LoRa in an outdoor experiments.

References
[1] F. Demir, D. A. Abdullah, and A. Sengur, ''A new deep CNN model for environmental sound classification,'' *IEEE Access*, vol. 8, pp. 66529–66537, 2020, doi: 10.1109/ACCESS.2020.2984903.