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From: SWATTER

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Summary

We had a meeting with Professor Matson for the novelty of our project. The meeting resulted in us focusing on just development of an application for UAV detection. We decided to compare the performance of an Android app embedding Machine Learning and an app using Cloud server computers for Machine Learning, and should choose a better one. We tried to find a way to run Machine Learning in Android applications. We were in the process of developing an Android application and a server program for Machine Learning and are still in.

What SWATTER completed this week:

- Had a meeting with Prof. Mattson. (01/25/2023)
 - We've been advised that it's better to use sound data than use vision data.
 - Dyeing or attaching a logo to the drone to be detected makes it difficult to detect the drone.
 - Since drones are filmed in various ways depending on the angle at which they are taken, a lot of visual data for training is required, and as a result, a high-performance computer is required.
 - In Figure 1, we can see how we listened to his advice.
 - Consulted on the novelty of the changed subject
- Had a meeting with Ph.D Yaqin and got advice for setting details of the topic. (01/27/2023)
 - Main topic is a way to implement an ML model for edge devices.
 - Binary classification model is easier/faster to train and implement.
 - Audio data is quite big, so running an ML model on an edge device (Smartphone) would be not easy. Yaqin's projects used a good GPU and Server.
 - Yaqin recommended specific drone models like 'DJI phantom 4' with 4 rotors and 'typhoon plus' with 6 rotors.
 - The 90% accuracy of the ML model is good results.

- We need to think about how to...
 - Reduce model size
 - Transfer data to model and computer
 - Send data to server
 - Run real time detection in edge device
- We should Create overleaf file for final documentation.
- Send a summary of papers about our project.
- If we make slides for a mid-term presentation until Monday, then we can talk about the presentation.
- We need to bring a drive to store training data at Monday
- Question 1. At the first time, We tried to compare the performance of the app-side version and server-side version. But how about using server-side only with many kinds of drones?
 - Answer : It needs multi classification. Besides we do not have many kinds of drone sound and times.
- Wrote the introduction part of our paper.
 - Retouch some parts of paper.
- Select machine learning models refer from previous papers.
- We will get UAV data on Monday, so the Machine Learning team wrote basic codes for Machine Learning.
 - SVM (Support Vector Machine)
 - GNB (Gaussian Naive Bayes)
 - KNN (K-Nearest Neighbor)
 - NN (Neural Network)
 - Model Structure
 - 3 Dense layers (128 nodes)
 - 2 Activation layers (ReLU)
 - 2 Dropout layers (rate = 0.1)

Things to do by next week

- Have a meeting with Ph.D. student, Yaqin
 - Proceed meeting about edge-computing on Jan. 23th around 10 A.M.
 - Finalize our goals and discuss details.
 - We need to bring a drive to store training data on Monday.
 - Send summary
- Design our experimental design
 - Design our experiments after meeting.
 - Set a way for comparison of Edge-Computing processing and Server processing.
 - Decide edge-device to cell phone.
- Develop and test an application and server.
 - Develop applications using Android Studio.
 - Server development through Linux development environment.
- Research example source for DeepLearning models running on android applications.
 - Research how to run deep learning models.
- Write a thesis up to related work version1.
 - Modify abstract and introduction according to the changed subject.
 - Send draft to Ms.Lee
 - Compare other related papers.
- Create PPT for mid presentation
 - Explain how to make a drone detection function.
 - Prepare for a question.

Problems or challenges:

- Implementation of machine learning models on a Smartphone as edge-device
 - In the case of edge-device, we need to implement machine learning models.
 - Some of the models that use scikit-learn are not supported in Android Studio.
- Designing efficient network packets
 - In the case of a server network, we need to design a packet for transferring data.
- Environmental settings with Android Studio.
 - We had to install and set up Android Studio, and it took a long time.

- Avoid duplicate expressions in paper.
- Paper revision
 - If the topic changes, the thesis must be revised.
- Credible page
 - It is difficult to distinguish whether a page is available for reference.

References

Fig1. Prof. Eric's description on the whiteboard.

