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Summary

During this week, various outdoor tests were done at Mr. Smith's farm to collect data needed for the paper of this project. Then, the data were analyzed in different ways by all team members.

In the next week, more data needed will be collected as the data collected until today are not enough. Then, the data will be analyzed again to increase the accuracy of the binary classification of drone detection.

What K2S3 completed this week:

- Having four outdoor tests
 - In total, four outdoor tests were done throughout this week: July 18th, 19th, 20th, and 21st. Two drones, Matrice 200V2 and DJI Mavic 2 Pro were used to collect data. Compared to the experiments that were done last week, different settings were applied to experiments this week.
 - In the experiment, two drones were flying at the same time. The detecting drone was hovering at the same position, and the target drone was moving in different vertical ranges and altitudes within the detecting drone's screen. The Euclidean distance between the detecting drone and target drone was fixed to 20m, 40m, 60m, 80m, and 100m. Also, data with no target drone was also collected to test the binary classification of drone detection. For each class, a total of 13 minutes of data were collected. Therefore, there were 6 different classes of data to classify and train the model.
- Analyzing the data of previous outdoor tests
 - From the data collected, the data were analyzed using different methods. Using the dataset of 6 classes, classification of 6 classes, classification of 5 classes except for 100m, classification of 4 classes except for 80m and 100m, and more were done to compare and contrast the results of them. It was able to detect and even classify the different distances. However, as the Euclidean distance between the target drone and the detecting drone increases, the train and test accuracy decreases. As the team members expected this result, more data will be collected next week to increase accuracy.

Things to do by next week

- Having more outdoor tests
 - As good data were made and analyzed by team members, complex situations will be set to collect data and further extend to the paper of this project. For example, expanding on the previous experiments, data will be gathered while two drones are both moving slowly in the same direction. Then, binary classification of drone detection will be done to know if the detecting drone can see the target drone when both drones are moving.
- Analyzing the data of outdoor tests
 - After collecting more data by having several outdoor tests next week, the data will be analyzed by all members. The data will be compared with the previous data collected. Also, the result of the data for next week will be also compared to the result of the data for last week.
- Finishing up the paper of this project
 - The experiment and the Conclusion part will be written and revised by all team members. Also, the Abstract, the Introduction, the Literature Review, and the Methodology part that are already written will be also checked and revised by the team members as the topic and the experiment results are updated this week.

Problems or challenges

- The weather condition of outdoor tests varied
 - As the data were collected on different days, the weather conditions of the days were different. It was expected to train well regardless of different days' weather conditions; however, the data were influenced a lot by the weather. Especially, the sound of wind and the drone swaying due to wind were the main obstacles when analyzing data. As data without the target drone and the data with the target drone were collected on different days, it was hard to test the binary classification of drone detection. Indeed, classifying different distances was also uneven.
 - Therefore, overcoming the limitation of weather conditions, no drone data and drone data were collected on the same day for the last two outdoor tests. In fact, after analyzing the data collected from the two outdoor tests, the result was even and reasonable.

References

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