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Summary

Throughout this week, the last outdoor tests were done at Mr.Smith's farm using two drones : DJI Matrice 200V2 and DJI Mavic 2 Pro. Also, the previous and the recent data collected were analyzed using different models to train both for vision and audio-base features. The paper of this project was also written until the Experiment part.

For the next week, as it is the final week of the project, both the presentation and the paper will be lastly revised and finalized by the team members. The last part of the paper, the Conclusion, will be written. Also, the Powerpoint that will be used while presenting is also planned to be done before the presentation date.

What K2S3 completed this week:

- Having last two outdoor tests
 - Two outdoor tests are done during the beginning of this week : July 26th and 28th. For the outdoor tests, DJI Matrice 200V2 and DJI Mavic 2 Pro were used to collect audio and image data. The audio data is collected using iPhone attached to Mavic 2 Pro, and image data is collected using the built-in camera of the Mavic 2 Pro, which is the detecting drone. The experiments were similar to the experiments that are done last week. With the Euclidean distance fixed to 20m, 40m, 60m, 80m, and 100m, the target drone and the detecting drones were flying at the same time. At this time, the target drone was moving within the range of the screen of the Mavic 2 Pro. Each distance represents the class, so in total, 6 classes of data are collected throughout this week, including the class of no drone data.
 - Also, unlike the previous experiments, one different experiment was done on the second day of the outdoor test. To test the data collected for 3 weeks, the test data was collected. For the test data, the Euclidean distance between the detecting drone and the target drone was not fixed, but rather had a range of 20m to 40m, 40m to 60m, 60m to 80m, and 80m to 100m. So, the target drone was moving vertically, horizontally, and also within the different Euclidean distances, maintaining the distance range of 20m. From collecting the test data, it is possible to analyze whether the models can classify the different classes within the range.
- Analyzing the data of previous outdoor test
 - When analyzing all 6 classes of previous data collected, it was not stable when the data are split by 3 seconds. Therefore, after reading and referring to previous papers, the data are split also by 1 second. After analyzing the data split by 1 second, the

results were a lot more stable than the data split by 3 seconds. Thus, in the research paper, the difference between the split time will be written and analyzed. The results of several models for audio and vision were compared and analyzed.

- For audio, after feature extraction using Mel-frequency cepstral coefficients(MFCC), Convolutional Neural Network(CNN) of Deep learning and Support vector machine(SVM) of Machine learning with different parameters were used to analyze. For vision part, after splitting the video files to image files, different versions of various models were trained to find the optimal result, including You only look once(YOLO) v5 and MobileNet v2. Overall, the accuracy and the performance were reasonable for most of the models. The team members are still analyzing the result of the data.
- Writing the Methodology and the Experiment of the paper
 - For the paper, the Methodology and the Experiment parts are written by the team members. As the various outdoor tests are done, enough data are collected in order to analyze and further write in the Methodology and the Experiment of the paper.

Things to do by next week

- Writing the Conclusion and revising all parts of the paper
 - As next week will be the last week of this program, the Conclusion of the paper will be done. Also, from the Abstract, all parts of the paper will be revised several times by the team members in order to write a organized and readable paper.
- Preparing for the presentation of the project
 - From this week, the team members are preparing for the final project. For the next week, the preparation of the presentation of the project will be finalized. Powerpoint will be used when presenting the topic and the contexts of the project. In the presentation, the overall process of the project will be presented. Wednesday of the next week is the day for the final presentation.

Problems or challenges

- Collecting data for writing the paper
 - As collecting data every week, there were always new factors that were influencing the data. These include the difference of the acoustic sound of the same types but different versions of the drones, weather conditions of different days, the sound of detecting drone itself whether than that of target drone, and etc. So, to collect a meaningful data to analyze in our paper, more data were collected using different methods. Although these were challenges for our project, these challenges were also the learning process for the team members. The members were able to know other factors that are affecting; therefore, they were able to understand more about the environment and the setting in order to write a meaningful paper that includes specific factors that can affect the data.

References

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