Report Date: 07/15/2022
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Summary

- Started dataset collecting
- Prepared final presentation
- Wrote Conclusion of the paper

What TN completed this week

- Wrote Experiment & Conclusion of the paper
    - Conclusion
        - This paper proposes to detect UAV velocity using audio data generated by driving a UAV. This project uses 3 kinds of ML models(SVM, Random Forest, LGBM) and DL model, CNN to detect UAV velocity. The dataset is collected in an indoor environment. If the velocity flies over 10mph, It is considered to be a fast one. If the UAV flies under 10mph, It is considered to be a slow one. The sound dataset is 3-second snippets. The dataset consists of nnn sound data. Two kinds of data show the difference between 6 of 20 features. Each data extract the feature using MFCC and is used to train the ML and DL models. Dataset is split in 80% training, 10% validation, 10% testing. All of the models show over 95% f-1 score(SVM: nn%, Random Forest: nn%, LGBM: nn%, CNN: nn%). Slow and Fast sound data show quite a difference in the 6 coefficients. It is helpful for the model to learn the difference between fast and slow sounds. The limitation of the research is two. First, the dataset is collected in an indoor environment.
          Future work will collect dataset in outdoor environments to experiment with more general conditions. Second, This project classifies binary class, fast or slow. After work, The model will classify the velocity of the UAV to have 5 mph intervals.
- Started to prepare the final presentation & presentation script
- Made the architecture for CNN model
- A code to view the Tensorboard was created. However, seeing the Tensorboard on a remote server(Google colab) is difficult, so a graph to see the loss and accuracy of train data and value data is being created.
- Started collecting the dataset from Tuesday.

        - From now on, we will drive the UAV in various ways, such as flying circles, flying side-to-side in front of the microphone, and hovering over the microphone etc.
- Update ‘generate_csv.py’ and ‘recording.py’
    - Now ‘generate_csv.py’ can label about two models of the UAVs.
    - Now ‘recording.py’ will record the sound of a flying UAV for 3 seconds and it will stop after recording 250 files, which takes about 12 minutes and 30 seconds.
- Read and summarize the paper [1].
    - Parkinson’s is a debilitating disease that creates a significant impact on the quality of life in the elderly. The onset of the disease at the molecular level occurs long before the revealing of prominent signs and symptoms. Detection of it at the earliest possible stage is essential for effective treatment and a good prognosis.
    - Machine learning algorithms applied to a computer-aided diagnostic system can assist in the most effective prediction of such disease.
    - Boosting algorithms prove to be effective in detecting Parkinson’s disease. In this work, Light GBM shows an accuracy of 93.39% and outperforms other algorithms with respect to other performance metrics. Thus, applying such algorithms will impose a positive impact in constructing an e-healthcare system for the patients so that the treatment process can be expedited and the severity of the disease can be reduced significantly.

Things to do by next week

- Finish to write the paper
- Finish the experiment to complete writing the paper

Problems or challenges:

- We are trying to collect the datasets using at least two kinds of the UAV for our research.
    - Our new drone (X5UW) can theoretically fly over 10 mph. However, we couldn’t drive the X5UW over 10 mph in our experimental environment.
    - X8SW drone got bumped while collecting the dataset, and it couldn’t fly anymore.
    - Team have to choose fix/buy the drone or stop collecting the dataset

References

[1] M. M. Nishat, T. Hasan, S. M. Nasrullah, F. Faisal, M. A. -A. -R. Asif, and M. A. Hoque, "Detection of Parkinson's Disease by Employing Boosting Algorithms," in *Proc. 2021 Joint 10th Int. Conf. on Inform., Electronics & Vision (ICIEV) and 2021 5th Int. Conf. on Imaging, Vision & Pattern Recognition (icIVPR)*, 2021, pp. 1-7, doi: 10.1109/ICIEVicIVPR52578.2021.9564108.