

EE / CprE / SE 492 - sddec22-13

Simultaneous Call Transmission

Bi-Weekly Report 5

10/26/2022 - 11/8/2022

Client: Collins Aerospace

Faculty Advisor: Dr. Andrew Bolstad

Team Members:

Sullivan Jahnke - Project Manager and Machine Learning Co-Lead

Json Rangel - Reports, Webmaster, and Communication Systems Co-Lead

Tyler Mork - Reports and Communication Systems Co-Lead

Austin Rognes - Research and Machine Learning Co-Lead

Hani El-Zein - Digital Signal Processing Lead and Research

Past Week Accomplishments:

- Sully: Completed Training Implementation, Trained
 - We can now train a model on our entire dataset using the pre-processing techniques that we talked about during our PIRM and with Dr. Bolstad.
 - The model outputs its accuracy and loss to a tensorboard log. I went through some research to understand how keras is calculating these metrics, and will use that knowledge to help decide parameters to adjust in the future.
- Json: GitLab Reformatting & .csv Reformatting
 - Reformatted simulation data and directory in GitLab.
 - Updated .csv files containing simulation data to new naming scheme.
 - Updated README files.
 - Transferred data folder from GitLab to CyBox.
 - Verified correct formatting for new .csv data simulation files.
- Tyler:
 - Created Test Simulation and corresponding data

- Data contains three interferers with no phase or frequency offset, and no noise
 - Data simplified to begin with until model accurately predicts
- Austin: Run first config files & convert matlab to C
 - Ran all configurations of window labeling to compare results
 - Created dummy training data set for from 192 sound files (25 hours runtime)
 - Made automated system for generating binary/csv files
 - Found a way to use Simulink Coder to convert the .slx files into C files for faster generation.

- Hani:
 - Editing and testing simulation, data generation.

Pending Issues:

- Discuss with the team and Dr. Bolstad on time signal manipulations for algorithm to increase overall performance
- Determine whether frequency shift caused by Doppler is negligible at the Commercial Airliner level for radio transmissions specifically.
- Begin EE documentation for simulation.
- Documentation could always be worked on.
- Prediction is different because our pre-processing objects are tailored towards training data. We still need to pre process the test data before predicting.
 - We will also need to separate our prediction logic from our training algorithm.

Individual Contributions:

Team Member	Contribution	Hours Spent	Total Hours
Sullivan Jahnke	Completed Training Implementation, Trained	8	73.5
Json Rangel	Data extraction, generation, and labeling. Simulation tweaks.	4	74
Tyler Mork	Doppler Effect, Archiving Live ATC Segments	7	66.5
Austin Rognes	Diagram of current Data importer	8	58

Hani El-Zein	Research and Doppler Effect	7	54
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Plans for Coming Week:

- Sully
 - Use a prediction script to output a graph that compares the test dataset to the actual predictions (use for presentations)
 - Continue shifting training parameters to try and improve accuracy (perhaps try using a convolutional neural network???)
 - Show EEs how well the model predicts so they know when to start making the dataset more complex / diverse
 - Put in a progress bar for preprocessing (adds a Python requirement but is easy)
- Tyler
 - Generate more data utilizing Test Simulation created prior
 - Support documentation archive for Simulink simulations
 - Support SE where applicable
 - Begin archiving more complex training data within CyBox
- Jason
 - Generate more data with updated simulation.
 - Continue to work on generating test dataset for the SE team to test on.
 - Begin documentation of Simulink simulations.
 - Support SE team
 - Reformat complex data with new Python script before passing it over to the SE team.
- Austin
 - Generalize C code for any machine to use. Make C program have many possible parameters.
 - Possibly use multithreading if needed/possible
 - Generate tons of data
- Hani
 - Add to simulation, more data generation, and finalize any concerns.