

EE / CprE / SE 492 - sddec22-13

Simultaneous Call Transmission

Bi-Weekly Report 2

9/17/2022 - 9/27/2022

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: WindowLabeler & .csv
 - Created a Python class to grab the labels correlated with the training data and output a single result using three configurable approaches
 - Majority: If the majority of the labels in the window are 1 then the entire window gets labeled as 1, else 0.
 - All: If all of the labels in the window are 1 then the entire window gets labeled as 1, else 0.
 - At Least One: If all of the labels in the window are 0, then the entire window gets labeled as 0, else 1.
 - Changed the algorithm to ingest data from .csv files rather than .mat files
 - Tested the class to make sure it was behaving properly then merged these changes into main.
- Json: Simulated Data Labeling
 - Generated timeseries data from simulation.
 - 10 seconds of data. Interfering signal present at time 5 seconds to 10 seconds.
 - Successfully extracted signal data from timeseries data.

- Merged column vector with labels to signal data.
 - Exported to .csv, containing time, signal data, and label.
 - Pushed data to personal branch of the Git repository.
- Tyler:
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- Austin:
 - Restructuring main.py, refactoring some of our classes.
- Hani:
 - Testing simulink file, research on doppler

Pending Issues:

- We only have one neural network layout configured. This limits us because we will never be able to know how other layouts perform if we don't try.
- The WindowLabeler is a good start at taking a window of data labels and generalizing it into a single output label, however it will never be exactly right if we are only outputting a 0/1.
- There needs to be more variety in the times that SCT is happening in the data. Right now, it only switches from 0 to 1 in one of our simulation outputs (switching after 5 seconds).
- Complex numbers from matlab are imported with 'i' at the end of the number. Python uses the letter 'j'.
- The structure of our master branch could be more practical.
- There should be much more documentation, specifically on building/running the algorithm.

Individual Contributions:

Team Member	Contribution	Hours Spent	Total Hours
Sullivan Jahnke	WindowLabeler & .csv	8	48.5
Json Rangel	Data extraction and labeling.	8	48
Tyler Mork			41.5
Austin Rognes	Restructuring	8	40
Hani El-Zein	Testing simulation model	4	34

Plans for Coming Week:

- Sully
 - Add another approach into the WindowLabeler that instead of outputting a 0 or 1, outputs a number between 0 and 1 indicating the percentage of labels that are 1 according to the window size (i.e (# of 1s) / WindowSize).
 - Add a few different neural network layouts to choose from, and make it configurable in the constructor.
 - One should change the output function to ReLU, and this one should only be allowed to use the labeling approach described in the above bullet point.
 - Add the 'evaluate' and 'predict' functions to our neural network class to use on test data. This outputs final metrics and then predicts (preferably on data it has never seen before).
- Tyler
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- Jason
 - Continue to extract and analyze simulated data.
 - Vary the time at which the interfering signal comes in.
 - Label data once extracted.
 - Export to suitable file format for Software team (.csv).
 - Optimize data labeling process.
 - Push labeled data to Git for Software to test.
 - Generate more data.
- Austin
 - Create data importer to incrementally import data.
- Hani
 - Research some more about doppler and attempt to incorporate its effects to the team's simulink model