Riley Harwood

Final Project Proposal

EN.605.81 – Dr. Jesus Caban

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* Train an object detector / classifier
* SAR image corner reflector detector
* ISAR image corner reflector detector
* Determine if an image is AI or something that fools ML detectors

**Goal Statement**

This project seeks to build an object detector using synthetic aperture radar (SAR) images as input and returns locations and annotated images as output.

**Problem Statement**

Object detection and classification is a highly studied topic in the image processing field. Most research and applications are done using optical images. There is some existing research in this area using radar imagery. It’s possible, though, that some of the techniques used to detect optical images have not yet been applied to SAR images.

This project topic appeals to me personally because I have been interested in machine learning based object detection for a long time. I am also getting ready to transition to a new job that focuses on processing radar images. This project should allow me to develop my skills in image processing while I learn about a topic that interests me and simultaneous prepare for a new job.

**Project Plan**

The main artifacts that will lead to a trained algorithm will be research, a dataset, and an evaluator. The research portion will be to learn more about radar imagery and object recognition techniques. I have some experience with each topic but additional survey of scholarly articles will be important to understand the successes and struggles of previous scientists.

Finding a dataset is the next step towards training an object detector. Because radar imagery is often captured for defense purposes, finding a dataset will be harder than it would be for optical images. During my initial research, though, I found a dataset of ships in the ocean that would suffice for detector training.

The final step will be to actually train an algorithm. As part of training and refining, it will be important to evaluate the results from the object detector. Some machine learning libraries have pre-built tools to do this. I’ll also want to visualize the algorithm results as a whole and on a per image basis.

**Timeline**

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| Module | Date | Project Task |
| Module 10 | 7/16-7/22 | Research – Part 1 |
| Module 11 | 7/23-7/29 | Research – Part 2 |
| Module 12 | 7/30-8/5 | Dataset selection and initial algorithm writing.  Revised Proposal due  Bibliography due |
| Module 13 | 8/6-8/12 | Algorithm complete, result visualizer created. |
| Module 14 | 8/13-8/19 | Debugging and reporting.  Final Project due on last day of module |