sdmay19-10: Distributed Wild Bird Surveillance and Recognition System

Week 12 Report
October 30 - November 11

Team Members

Claudia Athens — *Systems Integration Lead*
Ben Simon — *User Interaction Lead*
Francisco Arreola — *Infrastructure Lead*
Pierce Adajar — *Machine Learning Lead*

Client

Dr. Joseph Zambreno

Faculty Advisor

Craig Rupp

Summary of Progress this Report

This status report is over the last two weeks. We had significant progress over demonstrating our project and running YOLO on the Jetson. We were able to demo our image pipeline to the client. This shows the Jetson capturing images, sending images via Google Cloud's API to our front end system, and displaying the images on our website. Separately, we were able to re-flash the Jetson board to install the Jetpack SDK. In addition to that, a kernel image update was done to load the camera's drivers. From these operations, we were able to run YOLO and detect birds on a printed sheet of paper. The current range for the detection is about three feet from the camera sensor.

Past Two Week's Accomplishments

- Demonstrated the image pipeline to the client
    - Created a simple web service that reads images from our Google Cloud bucket
    - Created a script that automatically pushed images from the board to the cloud
    - Configured the camera drivers on the TX1
    - Demoed taking a picture on the Jetson and sending it to the frontend
- Got CUDA/necessary libraries to run on the board properly with camera drivers
- Ran YOLO on the board
- Detected printed pictures of birds at close range on the board

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Pending Issues

Currently having issues running YOLOv3 on the Jetson board. We have been investigating the issue and it seems to be a possible issue with the YOLO config files. Once this is resolved, we need to look into the capture size that YOLO is able to use. When trying to capture at 4192x3120, YOLO never started. It's possible this resolution is too high, but we need to take the images at a higher resolution for better image quality.

Plans for Upcoming Reporting Period

This upcoming week, we will continue to implement the front end and image pipelines. Piece will be working on

creating a detection system/API to run on the Jetson.

Individual Plans:

Ben:

- Create a clean interface that displays images from google cloud bucket
- Streamline deployment of the server.
    - Make it intuitive and easy for users to run the webpage
- Look into designing the streaming client with Francisco.

Claudia:

- Create C++ wrapper to integrate YOLO into camera application.
    - Capture and store images when YOLO detects a bird.
    - Also look into just using GStreamer to pass video into YOLO and capture image from there.
- Write script to startup applications like camera capture and image uploading to the cloud automatically.

Francisco:

- Implement the gstreamer video pipeline to take in the raw camera output, and stream the video.
- Begin working on a gstreamer element to encapsulate yolo so we can run object detection on the video stream and extract detection data.

Pierce:

- Finish setting up training of NN so that it can be trained over break
    - Set up monitoring via TensorBoard
- Set up model saving / loading via tf.saver
- Write software to automate / abstract evaluation of NN

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Claudia Athens	Was able to get CUDA/CUDNN/OpenCV/etc. to work properly with flashed camera drivers. Able to capture and save videos from the camera. Got YOLO/TinyYOLO running on the board and working towards developing a more intelligent image capture system with OpenCV/YOLO.	18	86.5
Ben Simon	I was able to get the website working with our Google Cloud bucket. It can display images and refreshes every image. I did research to design a clean interface using HTML, CSS, and JavaScript. I also assisted in helping setup the demonstration and Jetson re-flashing.	18	85.5
Francisco Arreola	Started researching the Gstreamer video processing pipeline. We plan on using this to run a lot of the main processes on the board, and provide a simple plug-and-play interface	15	83

	to interact with out video stream. Additionally, Gstreamer will provide many built in modules to simplify the task of video encoding and streaming.		
Pierce Adajar	Worked out formal implementation of the neural network, began setting up training on the Titan machine in the lab. Aided with Jetson re-flashing with camera drivers.	15	82.5

Meeting Notes With Client

We had one meeting with our client over the reporting period. We had demonstrated our work with the image pipeline. We showed a captured image being sent from the Jetson to the webpage. The only issue with the demo was that it took a significant amount of time to start the demo. We will be allocating more effort to streamline the user experience for the demo.

Gitlab Activity Summary

adajarp pushed to branch `rework_model` — 2 days ago
`ba8bdefb` · Adding my PyCharm project folder to the gitignore

adajarp pushed to branch `rework_model` — 2 days ago
`4e055e42` · Updated Birds CNN Model Function

basimon pushed to branch `ben_experiments` — 3 days ago
`938ef13f` · added extra things

basimon pushed to branch `ben_experiments` — 2 weeks ago
`aa5bf132` · oops forgot to add some things

basimon pushed to branch `ben_experiments` — 2 weeks ago
`aade95ed` · working on flask server

basimon closed issue #1 — 2 weeks ago
Add cloud storage api to the aviary

basimon commented on issue #1 — 2 weeks ago
@farreola

basimon commented on issue #1 — 2 weeks ago
stuff

Oct 30, 2018 2:25am

farreola pushed to branch `master` — 2 weeks ago
`0d6dba2a` · Added bash script to watch a folder and upload pngs in the folder
... and 1 more commit. Compare e2930654...0d6dba2a