Team 3 Bi-weekly Report : 03
February 10th - February 23rd

Summary:

Object Detection:

We tried training a new model of neural network (Faster RNN inception) in order to improve accuracy of the output. But after a discussion with the team and Dr. Zambreno, we analyzed the tradeoff between the need for speed and accuracy for our project and decided to stick with MobileNet SSD.

In addition, we have started looking into better ways to determine the bounding box coordinates. We are trying to see if this can be done automatically by the neural network. We have also started working on a Python script that finds all of the coordinates of the bounding box by checking the existence of the specific box color.

Distance Measurement:

We obtained two matching cameras from our client and began working with them. We started by calibrating the cameras using openCV, however this had almost no effect on the distortion in the image. Our advisor recommended that we use a larger checkerboard pattern for the calibration, so we will see if this further reduces distortion. Further, we began implementing and testing the code to find matching sections of images in stereo images. We had little success doing this solely based off of pixel intensity, and have began looking into more advanced methods such as using MSER.

Pending Issues

- Getting the python script to actually output coordinates of the bounding box. Currently, it just finds the box in the image.
- Fixing issues with training of MobileNetSSD on the TitanX box.
- Figuring out if there is an alternate way to get coordinates of bounding box.
- Detecting matching object in stereo images
- Camera images are still distorted after calibration

Plans for the Upcoming Work Period

During the upcoming work period we plan to complete the code to find matching objects in stereo images. With this in place, we will be able to begin developing and testing the distance measurement algorithm

using the cameras provided by SmartAg. Additionally, we are not able to adjust the focus on one of the cameras due to a hardware failure, so we will try to resolve this with our client. We will also try a different method for calibration the cameras to see if we can further remove distortion from the images.

Individual Contributions

John:

- Team Role: Communications Lead
- Contribution:
  - Acquired matching cameras from our client
  - Calibrated the cameras using openCV to correct for distortion in the images
  - Tested stereo object matching script with live video and found that it didn't work as expected
  - Began researching more accurate ways to find matching objects in stereo images including using maximally stable extremal regions (MSERs)
- Hours Worked: 12
- Total Hours: 26

Souparni:

- Team Role: Meeting Facilitator
- Contribution:
  - Worked with Bowen to set up and train the new neural network on TitanX.
  - Discussed with Eric on the different implementation of getting bounding box coordinates.
  - Wrote a script in python to detect bounding box by comparing the corresponding color value in image.
  - Looked into code from neural network to see if the bounding box coordinates can be extracted automatically.
- Hours Worked: 12
- Total Hours: 27

Fahmida:

- Team Role: Tester
- Contribution:
  - Calibrated the cameras using openCV to correct for distortion in images along with John
  - Experimented with maximally stable extremal region code example provided by Opencv
  - Read and compared methods to detect blobs within an image such as Maximally Stable Regions, Harris etc
  - Hours Worked: 8
  - Total Hours:

Ashley:

- Team Role: Document Manager

- Contribution:
  - Helped calibrate the cameras
  - Researched issues with calibrating cameras
  - Read multiple academic papers
  - Hours Worked: 12
- Total Hours: 15

Eric:

- Team Role: Webmaster
- Contribution:
  - Looked into code to input into our script to return the pixel coordinates of the bounding boxes in addition to the images themselves.
  - Talked about a few approaches we could take with Souparni
  - Looked into alternate ways of post-processing our trained images
    - Sobel filter
  - Hours worked: 12

- Total Hours: 25

Bowen:

- Team Role: Hardware Maintainer
- Contribution:
  - Setup tensorflow on the Titan GPU.
  - Setup and Trained images on AWS.

- Hours worked:8
- Total Hours: 16