Group number: 20-18

Project title: Development of Image Analysis Algorithms for Crack Detection Using a Smartphone

Client &/Advisor: Bo Yang/Halil Ceylan

Team Members/Role: Akira Demoss, Maggie Dalton, Modeste Kenne, Nik Thota

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- ○ **Weekly Summary**

This week was mostly getting each member caught up with installations so that everyone can work on algorithm in an identical environment. In past weeks Akira found a setup that works well and the rest of us have been acquiring computers and setting them up to match her environment. While this has been time consuming, we believe that it will reduce issues with compatibility when working on the algorithms individually.

- ○ **Past week accomplishments**
  - ● Maggie
    - ○ Worked on setting up the TensorFlow environment (most of the time during this week was spent here)
      - ■ Installed CUDA
      - ■ Installed OpenCV
    - ○ Started working on the Android application recording the location of the device when a specific object is detected
      - ■ It currently successfully grabs the location of the device when a keyboard is detected
      - ■ It writes the locations to a file on the Android device
      - ■ The collection and writing of location to a file slow down the application

- Akira
  - Documented installation steps for Cuda 9 and OpenCV 4.0.0
  - Documented steps for freezing a tensorflow graph
  - Helped team members overcome installation challenges with 3rd party software.
  - Completed the first step in converting a frozen tensorflow graph to a tensorflowlite model which involved building a subsection of tensorflow which is a tool called freeze_graph. This integrates all of the outputted tensorflow files into one tensorflow file with the file extension '.pb'
  - Wrote a realistic project plan and timeline for the rest of the semester.
- Modeste
  - Started working on client/server communication
    - Set up client-server communication that will run our image processing android application
    - Tested server using an html file from one of our resources
  - Set up android client application in Android Studio
    - Was able to get the camera preview to display
- Nik
  - Installed Cuda 9
    - Followed instructions set forth by Akira
  - Installed OpenCV 4.0.0
    - Followed instructions set forth by Akira
  - Finished project timeline for current semester and following semester
    - Added to the Design Document
  - Edited Lightning Talk
    - Clipped together sound clips sent by other members and attached them to the appropriate slides

- **Pending issues**
  - Maggie
    - Started with trying to set up the TensorFlow environment on my personal desktop computer but ran into some issues partially due to doing the setup on Windows. I had wanted to set it up on my desktop computer because I have a strong GPU, but didn't want to change my OS to Linux (would impact projects for other courses). It took a long time and seemed like most of the setup worked, but the given TensorFlow examples would not run. I ultimately wasn't able to diagnose why.
    - I checked out a laptop from SSG like Nik, installed Ubuntu, and began setup on the SSG laptop. It seemed to have worked but at the end I

wasn't able to run. It turned out that while the laptop looked almost identical to the one that Nik checked out (with an Nvidia GPU), mine was different (with an Intel GPU) and because of this the installed libraries/drives wouldn't work on that laptop. I've talked to SSG about checking out a different laptop with an Nvidia GPU but they have to fix one up. I'll have it checked out and working by the end of the following week.

- Akira
  - When trying to convert the frozen tensorflow graph to a Tensonflowlite an error message was encountered explaining that a custom implementation for 'ResizeNearestNeighbor' would be needed in order to convert the model to Tensorflow light. This may be potentially worked around by creating this custom implementation, or it may be more practical in terms of time management to evaluate whether we may be able to seamlessly convert a yolov2 model into a tensorflowlite model without the need for creating a custom implementation that may require more time educating ourselves and take away from training time.
- Modeste
  - After setting up the client application in Android studio, although it could display the camera view, I was not able to actually capture an image/video and send it back to the server.
- Nik
  - Had some installation issues with both Cuda 9.0 and OpenCV 4.0.0, but these were resolved after discussing with Akira
  - Had slight difficulty creating timeline for Spring semester because we need to leave room for adjustments to our solution

  - **Individual contributions**

Name	Individual Contributions	Hours this week	Hours Cumulative
Akira Demoss	Froze TensorFlow graphs, helped others set up environments	10	54
Maggie Dalton	Worked on setting up environment, added location collection to Android	13	31

Modeste Kenne	Set up server, tried to send images to server	9	15
Nik Thota	Installed Cuda and OpenCV, stitched together lightning talk, and created the project timeline	11	27

- ○ **Comments and extended discussion**

- ○ **Plans for the upcoming week**
  - ● Maggie
    - ○ Set up TensorFlow environment on checked out SSG laptop
      - ■ Get Akira's algorithm working on it
    - ○ Work with Akira on figuring out how to convert a model to ".tflite"
    - ○ Come up with a solution to reduce the lag created by grabbing the location/writing to file
      - ■ Likely can be solved with an Async task
    - ○ Add the converted ".tflite" model to the application
  - ● Modeste
    - ○ Figure out and resolve issues with the image capturing.
    - ○ Transfer a test image to server for processing
    - ○ Get familiar with Tensorflow
    - ○ Do a literature review about server/client communication
  - ● Nik
    - ○ Experiment with Cuda and OpenCV to get an idea of how it works
    - ○ Look at some tutorials for Tensorflow
    - ○ Work with the others to do an example training

- ○ **Summary of weekly advisor meeting:** Our meeting with Bo this week was largely a progress update. We did also discuss setting up bi-weekly demos with him at the time we've met the past two times. Bo updated us that he added some helpful literature to the shared CyBox and requested we post the reports there as well as the website. We asked him a few questions to finish up the Design Document. Bo also offered trying to work with his department to get us access to a phone with a strong GPU/CPU if it would aid in progress on our project.