EE/CprE/SE 491 WEEKLY REPORT XY

10/15/2019 – 10/29/2019

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 our group worked on finalizing the setup of the development environment necessary to train a machine learning algorithm. This period of work started promisingly with decent progress, but ultimately our group experienced many challenges that are preventing us from finishing this portion of our progress.

- **Past week accomplishments**

- Modeste
  - Created an additional project in Android Studio to transfer files on the server
  - Got familiar with Tensorflow
  - Did a literature review on server/client communication
- Maggie
  - Confirmed OpenCV/CUDA installation works
    - Successfully detected an object on a sample model that was pre-trained
  - Worked on going through the process of training a model using an existing, labeled dataset
    - Set up configuration of the training to match the dataset
    - Prepped an existing dataset for training
      - Splitting the dataset for training/testing
      - Additional configuration files for proper use of the labeled data
    - Modified training algorithm to save weights periodically and frequently
- Nik

        - Worked on running OpenCV/darknet example
            - Troubleshooted to fix consistency errors
            - Reinstalled all required software and dependencies twice
        - Had an issue with my PC hardware, for which I went to SSG to resolve
    - Akira
        - Converted a tensorflow frozen graph to a tensorflowlite model which can be imported into an android application
        - Documented steps for training a neural network for object detection

- **Pending issues**
    - Maggie
        - Training seems to be mostly successful but cannot detect the object and the reason is unclear. When the model is training some data is output to the terminal with information on the progress. This progress seems normal for the first couple hundred iterations, but then outputs nonsense. Regardless of using the weights from the end of training or before the nonsense, the model does not detect the object. When running the detection algorithm it will execute with no errors, but no bounding box is drawn. The reason for this is unclear.
    - Nik
        - Issues with python paths in OpenCV tutorial/example
            - Certain python dependencies are not being recognized/"do not exist"
            - Assuming its an issue with their paths
        - Had an issue with my borrowed PC battery
            - Went to SSG to get it replaced
    - Akira
        - Was able to convert a tensorflow frozen graph to a tensorflowlite model, however when swapping this model in for the boilerplate tensorflow object detection model, there was an error indicating that they byte size that the model had converted to was incorrect.

- **Individual contributions**

Name	***Individual Contributions***	***Hours this week***	***Hours Cumulative***
Akira Demoss	Converted tensorflow graph to a tensorflowlite model and helped team members debug their development environment	12	66
Maggie Dalton	Trained new model to detect object using YOLO v3	10	41

Modeste Kenne	Created an additional project in Android Studio to transfer files on the server	9	32
Nik Thota	Troubleshooted the openCV example and looked closely at the python paths	8	35

- **Comments and extended discussion**

This is a very complex problem and challenge, while it is exciting to work on we believe we would be able to make progress more quickly with expertise in the area of machine learning. A lot of issues that we are having is concerned with debugging third party software learning how to use the tools involved with conversions. We could potentially train using technology other than YOLO (mobilenetSSD, yololite etc), however identifying a TA or faculty member who could help us in the case that we get stuck on a build issue would help speed up our progress exponentially.

- **Plans for the upcoming week**
  - Modeste
    - Learn from teammates how use datasets to train model
  - Maggie
    - Work on solving the issue that is preventing the model from training properly
      - If successful, finish training model and work towards training a model with a custom-labeled dataset
    - Label images for a dataset of cracks in pavement
      - Install necessary software and learn to use it
  - Nik
    - Figure out the issues I am having with python
    - Edit and submit next week's lightening talk
  - Akira
    - Install LabelImg and label images in VOC pascal format
    - Research about Deep learning backends other than darknet for training custom neural networks.

- **Summary of weekly advisor meeting**

Briefly met with Bo and updated him on the group's progress.