EE/CprE/SE 491 - sddec23-10

Developing a Deep Learning Model to Automatically Detect Microscale Objects in Images and Videos

Week 1-2 Report

09/01/2023 – 09/16/2023
Client: Professor. Santosh Pandey
Group number: 10

Team Members:

Katherine Moretina
Ethan Baranowski
Chris Cannon
Matthew Kim

Setting up meeting time

Hardware

- Order all hardware for first prototype
  - Raspberry Pi and accessories
  - Camera
  - Camera Lens
  - Monitor
- Launch camera on Raspberry Pi through ribbon connector
  - Was done by enabling camera setting in the Pi
  - https://www.youtube.com/watch?v=bpzGN35oaJ4
  - Should be able to configure camera using ribbon connector using this method
  - Taking pictures : raspistill -o *name of picture*
  - Linux command man raspistill brings up options to explore for GUI
- Interface ideas (GUI)
  - Find GUI on github and tinker with open source code
  - Constant display from camera
  - Push button connected to GPIO header

    - Display of number of cysts
- Open-Source GUIs
    - https://github.com/chepo92/Raspberry-Pi-Camera-App
    - https://lawsie.github.io/guizero/

Software

- Detectron2 dependency:
    - https://detectron2.readthedocs.io/en/latest/tutorials/install.html
- Requirements
    - Required python version: Python ≥ 3.7
    - PyTorch ≥ 1.8
    - OpenCV needed by demo and visualization
    - gcc & g++ ≥ 5.4
- From git:
    - ::

```
python -m pip install
'git+https://github.com/facebookresearch/detectron2.git'
# (add --user if you don't have permission)

# Or, to install it from a local clone:
git clone https://github.com/facebookresearch/detectron2.git
python -m pip install -e detectron2

# On macOS, you may need to prepend the above commands with a few
environment variables:
CC=clang CXX=clang++ ARCHFLAGS="-arch x86_64" python -m pip install …
```

- Deploy
    - https://detectron2.readthedocs.io/en/latest/tutorials/deployment.html
    - tracing: see pytorch documentation to learn about it
        - https://pytorch.org/tutorials/beginner/Intro_to_TorchScript_tutorial.html
    - scripting: see pytorch documentation to learn about it
        - https://pytorch.org/tutorials/beginner/Intro_to_TorchScript_tutorial.html
    - caffe2_tracing: replace parts of the model by caffe2 operators, then use tracing.

Individual Contributions

Member	Tasks Completed	Hours This Week	Total Hours
Katherine Moretina	Researched parts to order. Mostly camera and lenses that would best suite our intended application Ordered Hardware Got parts from ETG to explore prior to our parts coming in Took pictures with the camera we ordered on Raspberry Pi	10	10
Matthew Kim	Researched the dependency of the Detectron 2. Also tried to search libraries that are related to Object detection. Study about object detection API from the tensor flow.	4	4
Chris Cannon	Researched Detectron training set format, began writing a script to transform our labeled data into that format. Finished labeling root photos.	4	4
Ethan Baranowski	Researched the process involved in training Detectron on a custom dataset, organized meetings.	5	5

Plans for Coming Week

- Research different open-source GUIs to develop upon
- Download code onto Raspberry Pi to explore more capabilities
- Finish script to transform LabelMe data into the correct format for Detectron