EE/CprE/SE 491 - sddec23-10

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

Week 4-6 Report

09/27/2023 – 10/11/2023
Client: Professor. Santosh Pandey
Group number: 10

Team Members**:**

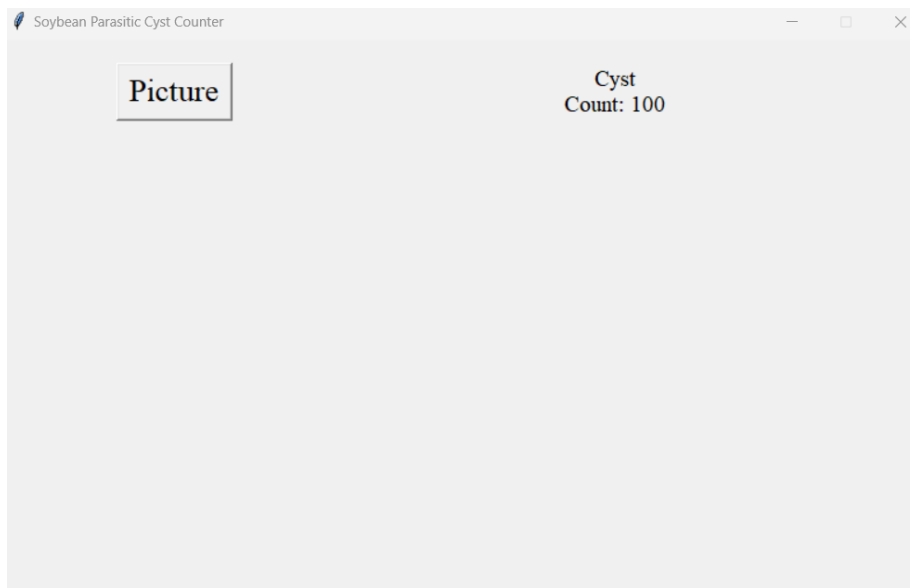Katherine Moretina
Ethan Baranowski
Chris Cannon
Matthew Kim

Hardware and GUI

- Initial Setup of hardware is done
    - What is seen on the LCD screen is what our camera for the project is seeing

- Initial GUI Structure

- Currently finding resources on PiCamera and creating a constant stream output on the GUI
- Also finding resources on putting a picture taken in a certain directory and pulling from that directory to upload on a machine learning model

Exporting Methods

- From
  - https://detectron2.readthedocs.io/en/latest/tutorials/deployment.html
- Detectron 2 recommends 3 methods for exporting.
  - Tracing: https://pytorch.org/tutorials/beginner/Intro_to_TorchScript_tutorial.html
  - Scripting: https://pytorch.org/tutorials/beginner/Intro_to_TorchScript_tutorial.html
  - Caffe2_tracing.

Export Method	tracing	scripting	caffe2_tracing
Formats	TorchScript	TorchScript	Caffe2, TorchScript, ONNX
Runtime	PyTorch	PyTorch	Caffe2, PyTorch
C++/Python inference	✅	✅	✅
Dynamic resolution	✅	✅	✅
Batch size requirement	Constant	Dynamic	Batch inference unsupported
Extra runtime deps	torchvision	torchvision	Caffe2 ops (usually already included in PyTorch)
Faster/Mask/Keypoint R-CNN	✅	✅	✅
RetinaNet	✅	✅	✅
PointRend R-CNN	✅	❌	❌
Cascade R-CNN	✅	❌	❌

- Transforming local model to Raspberry pi.
  - Tensor Lite

Individual Contributions

Member	Tasks Completed	Hours This Week	Total Hours
Katherine Moretina	- Created initial GUI - Looked for resources on different Python Libraries for GUIs - Found open source GUIs that use a constant stream from cameras	10	26

	● Finished labeling data		
Matthew Kim	● Labeling done. ● Tried to find a ways to deploy our demo (balloon) trained model to the local drive, therefore it is possible to transfer to the raspberry pi using Tensor Lite.	5	13
Chris Cannon	● Finished Dataset setup script ● Migrating Dataset to the cloud to utilize cloud computing resources ● Beginning work on exporting a trained model to a local environment	5	15
Ethan Baranowski	● Compiled Full image dataset and ran script to generate json file compilation. This accomplished transforming the dataset into the desired format for training. Attempted to run the training algorithm on the newly compiled dataset. Failed because of local memory issues illustrating the need to train in a cloud environment.	15	26

Plans for Coming Week

- Create live stream from Raspberry Pi Camera
- Order final parts for the hardware prototype
- Convert open source GUI using wxPython library to tkinter library
- Finish script to transform LabelMe data into the correct format for Detectron
- Debugging exporting methods (tracing) and try other methods as well (caffe2, scripting)
- Attempt to upload dataset in zip format to google colab for extraction and training.