
EE/CprE/SE 491 - sddec23-10

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

Week 6 Report

03/6/2023 – 03/12/2023

Client: Professor. Santosh Pandey

Group number: 10

Team Members:

Katherine Moretina

Ethan Baranowski

Chris Cannon

Matthew Kim

-----Katherine-----

<https://github.com/jwyang/faster-rcnn.pytorch> Popular implementation of faster R-CNN

This week, I spent some time trying to run the faster R-CNN implementation to see if it worked on the trained model and images that are provided on Github.

- Installed pytorch
- Installed CUDA
 - A lot of issues installing CUDA, had to research CUDA more
- Installed all packages in requirements.txt
- The GitHub provided a lot of insight about how to run the code with a shell script
- I was able to download a pre-trained model
- Gave the specifications to run the shell script on my computer
- Successfully ran the R-CNN implementation

-----ETHAN-----

<https://github.com/kuanhungchen/awesome-tiny-object-detection#tiny-object-detection> “tiny object detector” specifically designed for clusters of birds

<https://github.com/zhaoweicai/cascade-rcnn/blob/master/README.md> Matlab/Python mixed implementation

<https://github.com/Ugenteraan/Faster-RCNN-RPN> - easy to understand guide through RPN and Faster-RCNN Jupyter notebook

import glob The [glob](#) module finds all the pathnames matching a specified pattern according to the rules used by the Unix shell, although results are returned in arbitrary order. No tilde expansion is done, but *, ?, and character ranges expressed with [] will be correctly matched. This is done by using the [os.scandir\(\)](#) and [fnmatch.fnmatch\(\)](#) functions in concert, and not by actually invoking a subshell.

import cv2
Pre-built CPU-only OpenCV packages for Python.

import xmltodict
xmltodict is a Python module that makes working with XML feel like you are working with [JSON](#)

import tensorflow as tf
The TensorFlow platform helps you implement best practices for data automation, model tracking, performance monitoring, and model retraining.

from tqdm import tqdm
tqdm means "progress" in Arabic (taqadum, تقدّم) and is an abbreviation for "I love you so much" in Spanish (te quiero demasiado).
Instantly make your loops show a smart progress meter - just wrap any iterable with tqdm(iterable), and you're done!

Individual Contributions

Member	Tasks Completed	Hours This Week	Total Hours
Katherine Moretina	Went to all required meetings- compared different faster R-CNN implementations. Ran the implementation with a pre-trained model and provided images.	3	22
Matthew Kim	Attended regular meetings to check a phase, and further research on R-CNN and labeling	2	10

	tools. Also research on the labeling programs to start labeling. Also discussed hardware designs.		
Chris Cannon	Attended regular meetings, tested label studio labelling software, continued background research. I also did in-depth research on YOLO, including YOLOv8	5	10
Ethan	Continued task development and deployment for iterative progress on algorithm selection and development. Helped with creation of website by providing necessary information. Consolidated the image repository into a categorized to help with the labelling task that will be starting soon.	4	27

Plans for Coming Week

- Investigate R-CNN implementations and create a baseline algorithm for us to modify for our purposes.
- Start labeling data with Label Studio software for training set. (313 images total).
- Have Yunsoo Park walk us through coding on the lab computer.
- Setup Jupyter Notebooks server for student collaboration.
- Investigate SIFT machine learning algorithm for possible simplified object detector that will help simplify algorithm training and implementation.
- Convert grayscale images to colored for labelling.
- Investigate Label Studio mismatch with Jupyter Notebook client. Both Label Studio and Jupyter Notebooks cannot be on the same machine due to differences in python environments.