Sequential Deep Learning on a Mobile Robot

Julian Weisbord, Michael Rodriguez, Miles McCall


fetch
fetchrobotics

Introduction

1. Purpose: train a robot to classify objects in its environment with high accuracy (above 80%). This robot also will continue to learn new information about the objects it sees as time goes on.

2. Goals: We would like the robot to learn cool things about objects it has encountered such as: who owns it, what colors are present, and how big it is

Team Progress

Michael:

- Data Collection (Mapping a room, having the Fetch collect data)

Miles:

- Graphics Hardware Research and Constraints (Intel Movidius NCS, NVIDIA GPU’s)
- Data Collection and Cleaning Support

Julian:

- Team Planning and Management
- Design and Implementation of CNN Model
- Sequential Learning Research
- Data Preparation and Cleaning

Miles’ Progress

Current Status

- We’ve split work effectively and communicate well
- Progressing each major piece of the pipeline
- A strong focus on research and alternative solutions
  - Movidius sticks, External GPUs
- Assisted Michael’s data capturing
- Assisted Julian's data processing / cleaning

Miles’ Progress Continued

What’s Left to Do

- Spent more time and effort on the Movidius sticks than I planned to
  - Will now look into external GPU cards more

- Finish implementing data gathering software

- Now focusing on assisting Julian’s testing, debugging, and developing of the CNN

Miles’ Progress Continued

Problems Impeding Progress / Solutions

- Researching the Movidius sticks took more time than I wanted to spend
  - Multiple dependency requirement issues
  - Hardware mismatches caused additional problems

Miles’ Progress Continued

Other relevant / interesting information

- If given more time / resources to work on the project…
  - More advanced object tagging methods
    - AR tags
    - RFID tags
  - Potential applications

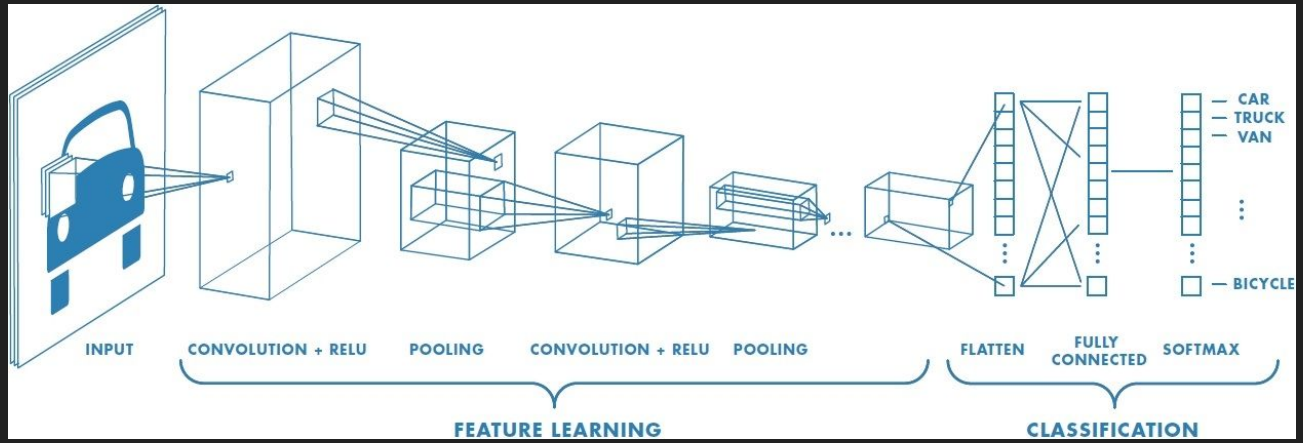
Julian’s Progress

1. Team Planning/Management
    a. Project Planning and Dividing Tasks Among Group Members
    b. Technical Advising
    c. Creating Progress Updates for Client Presentations
    d. Software Choices and Design Standards

Julian’s Progress Continued

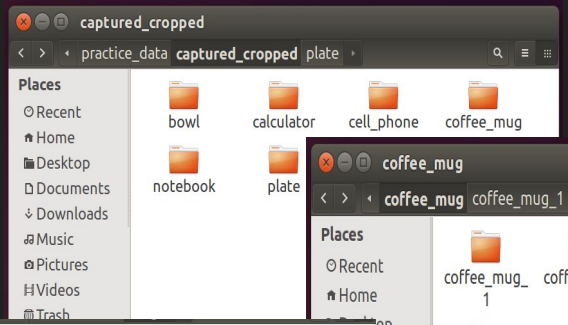
2. Design and Implementation of Convolutional Neural Network Model

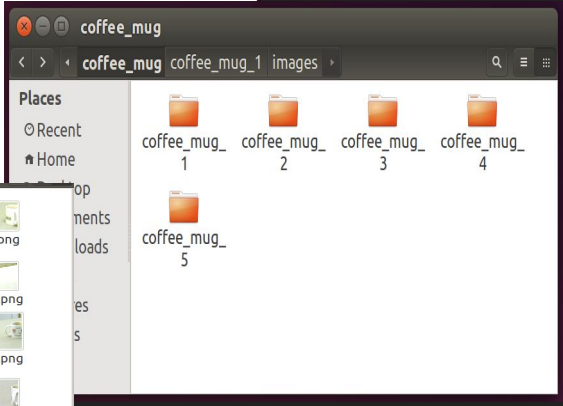
    a. Learning Tensorflow
    b. Researching Different Architectures
    c. Implementing Layers, Loss Function, and Training Software
    d. Picking Parameters/ Using Inception

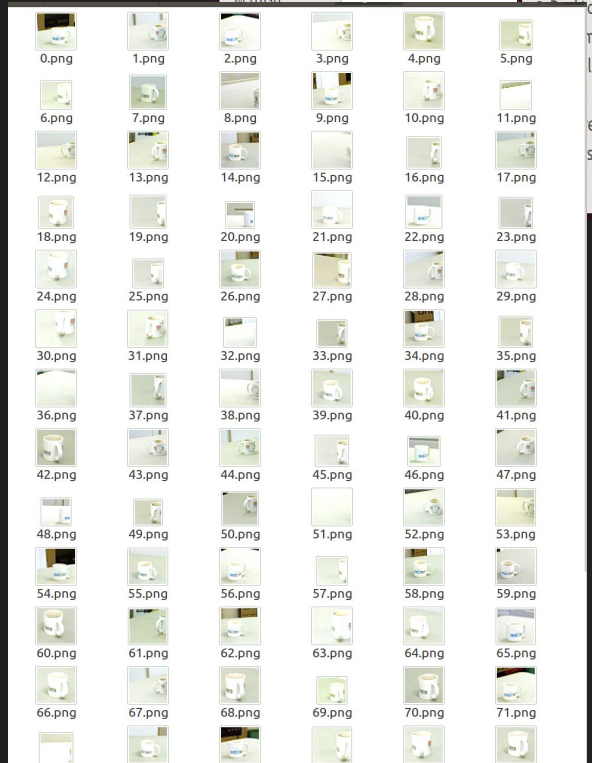


Julian's Progress Continued

3. Data Preparation and Cleaning
    a. data_preparation.py
4. Sequential Learning
    b. Research







Michaels’ Progress

Video Capturing Session

Michaels’ Issues/Solutions

- Ubuntu installation
- Fetch temporarily out of service
- Scheduling conflicts

Michaels’ Left to do

- Capture data
- Gather objects
- Improve speed of data capturing