Re-Identification System Implementation Doc

Devices:

Cam1 (RPi Model B, Logitech C270 Webcam):

- IP: pi@128.46.75.219, Password: pass1

Cam2 (RPi Model B, Logitech C270 Webcam):

- IP: pi@128.46.75.210, Password: pass1

Server (Jetson Nvidia TX2):

- IP: nvidia@128.46.75.212, Password: nvidia

Data Transfer (Node to Server):

- https://github.com/chenxiaoqino/udp-image-streaming
  - Requires OpenCV and related dependencies
- Enables UDP connection over ethernet with full serialization and compression of .jpg video frames, worked out of the box on both TX2 and RPi
- My modifications:
  - Reformatted and changed the console output
  - enabled saving frames to device
  - enabled flag to choose between showing video or saving frames
- Chose saving .jpg files over writing raw cv::Mat's due to "Corrupet JPEG data" error as well as possible overhead in extracting the data from the files correctly
- Time from writing Raspbian OS to the RPi to running UDP-image-streamer: ~3 hours
- Use of UDP enables 'connectionless' (no binding) client-server run, i.e. seamless update and redeployment on either end without affecting the other
- Server instances must be ran as separate processes in separate terminal sessions
- Server launch cmd: **./server <Server Port> <Source Camera Name> [-w | -s]**
  - -w = write, writes at ~9fps (enabled by default)
  - -s = show video stream, shows at ~7fps
  - Both cannot be enabled simultaneously
- Node launch cmd: **./client <Server IP> <Server Port>**
- Future Work:
  - Node-side neural network for filtering of images with no objects detected. (Ex: a 5 minute test run at approximately 4:30PM on Wednesday, June 20th, 2018 yielded 77% (1618 out of 2095) of the captured frames to have no useful data for re-identification)
  - RPi Caffe Install guide: http://caffe.berkeleyvision.org/install_apt.html

Server storage (Future Work):

- Persistent data storage for ID'd people
- Looking into dynamic KD-Tree as storage data structure. Enables relatively fast 'nearest neighbor' look-ups (on cache miss, read below)

- Also looking into auxiliary temporary storage in the form of an LRU cache for immediate fast look-up of recently ID'd people to aid in 'real-time re-id' capability (exact implementation unsure, hashmap not possible)
- https://ieeexplore-ieee-org.ezproxy.lib.purdue.edu/document/7374714/