CS696E Progress Update 6

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Problems I'm Working On

- Broadly speaking, problems in the facial recognition domain
    - Clustering of unknown faces to detect similar faces across images
    - Recognizing age from faces to determine kids vs. adults in images

Previously on CS696E….

- Functioning child/adult estimator pipeline!
  - Created my own child/adult dataset that combined all the images of two separate datasets, APPA-REAL and UTKFace, and changed labeling scheme to be much simpler adult vs. child
    - ~25k faces of adults, ~6k faces of children
  - Fine-tuned pre-trained Squeeze-and-Excitation network on this dataset
  - Obtained validation accuracy of around 95%
- For whole images, this pipeline uses the same DSFD face extractor for extracting faces, after which classification is done on the extracted faces

Where I'm At Now [1/2]

- Explored object detection with object size calculations
  - Worked with a PyTorch-based Faster RCNN implementation
  - Didn't really work, one of the main issues I ran into was perspective in images (objects can have a fixed size, but if the perspective is different for the object, then the fixed size won't help)
- Worked with Brian's dataset
  - Manually split into adult/child classification, tried training two-class classification network with these added images
  - Surprisingly, results were actually **worse**

```
Epoch: 39 Loss: 0.0326
Epoch: 40 Loss: 0.0336
Validation accuracy: 95.1572 MAE: 0.0484
Epoch: 41 Loss: 0.0377
Epoch: 42 Loss: 0.0337
Epoch: 43 Loss: 0.0279
Epoch: 44 Loss: 0.0269
Epoch: 45 Loss: 0.0285
Epoch: 46 Loss: 0.0283
Epoch: 47 Loss: 0.0249
Epoch: 48 Loss: 0.0247
Epoch: 49 Loss: 0.0251
Finished Training
```
Initial dataset training accuracy

```
Epoch: 39 Loss: 0.0736
Epoch: 40 Loss: 0.0397
Validation accuracy: 94.0865 MAE: 0.0591
Epoch: 41 Loss: 0.0440
Epoch: 42 Loss: 0.0337
Epoch: 43 Loss: 0.0780
Epoch: 44 Loss: 0.0350
Epoch: 45 Loss: 0.0283
Epoch: 46 Loss: 0.0296
Epoch: 47 Loss: 0.0322
Epoch: 48 Loss: 0.0265
Epoch: 49 Loss: 0.0288
Finished Training
```
Updated dataset training accuracy

Where I'm At Now [2/2]

- Re-designed age classification dataset to be a three-class problem and trained a three-class classification network
  - Class ages were <12 years, 13-17 years, and >18 years
  - Training parameters and architecture were same as previous
  - Got validation accuracy of 94.1309%, however misleading figure due to class imbalance in training
  - Further testing is necessary

```
Epoch: 19 Loss: 0.0993
Epoch: 20 Loss: 0.0932
Validation accuracy: 94.1309 MAE: 0.0699
Epoch: 21 Loss: 0.0923
Epoch: 22 Loss: 0.0826
Epoch: 23 Loss: 0.0755
Epoch: 24 Loss: 0.0770
Epoch: 25 Loss: 0.0790
```

Three-class classification accuracy

What's Next?

- Try to improve performance on age classification
- Open to other ideas