DETERMINING FAMILIAL RESEMBLANCE FROM FACE IMAGES

CS230
Dec 2019

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Problem statement and data

- This project is based on familiar recognition and verification task. Specifically we model parent-child relationship through deep learning on facial images.
- Dataset used: Family In the Wild (FIW)[1]
- Downloaded data captures 11 relationships across 3 generations for 1000 famous families, 5348 persons with total of 26541 face images.
- Concerned here with only parent-child relations (F-S, F-D, M-S, **M-D**).

Examples of 1st Gen relationships, demonstrating diversity in age, pose, lighting conditions, and ethnicity

Mother – daughter

Mother – son

Father – daughter

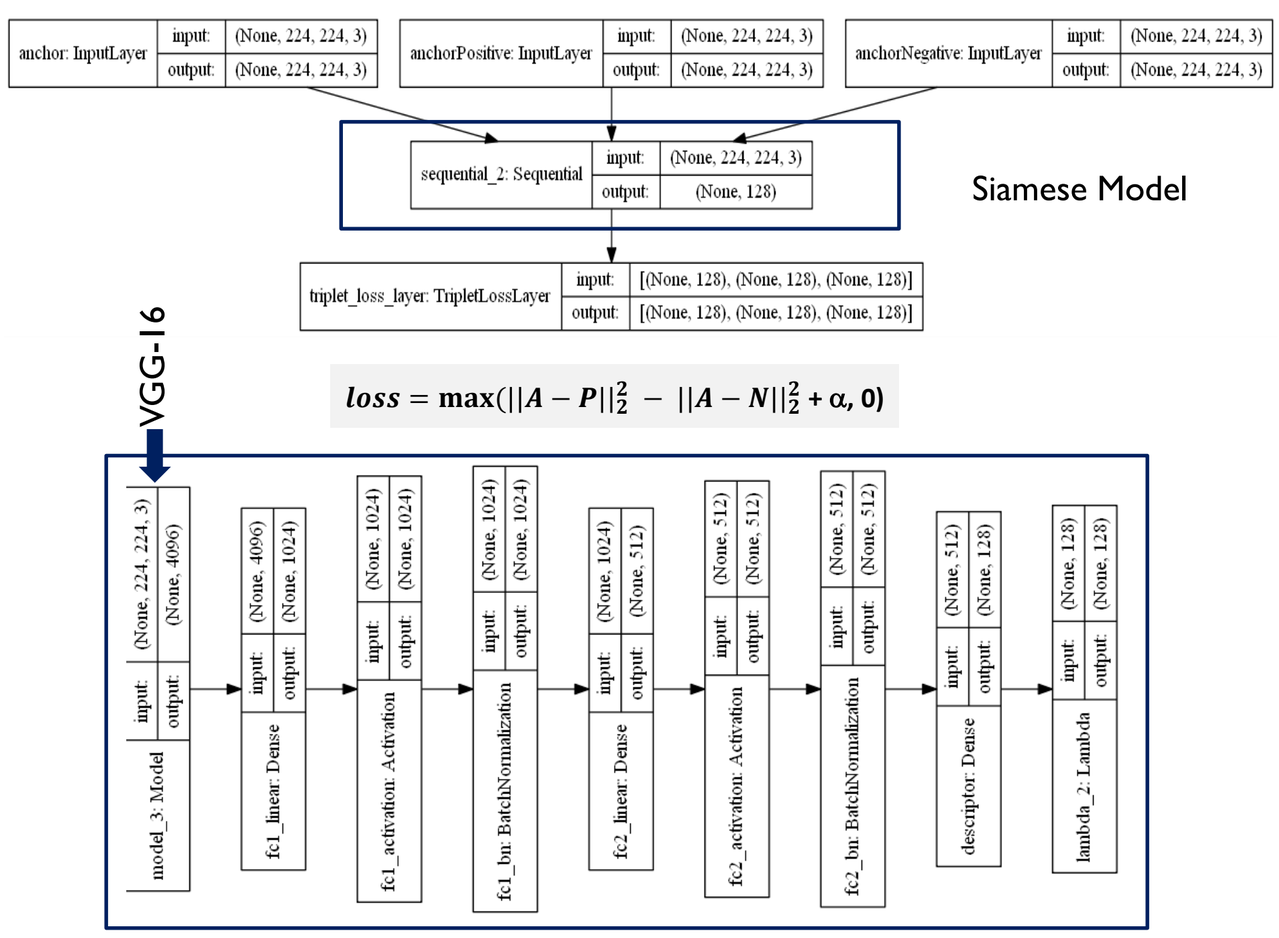
Father – son

Ethnicity distribution

Caucasian	Spanish/Latino	Asian	African/AA	Arabic	Mix
64%	10.7%	9.1%	8.2%	2%	6 %

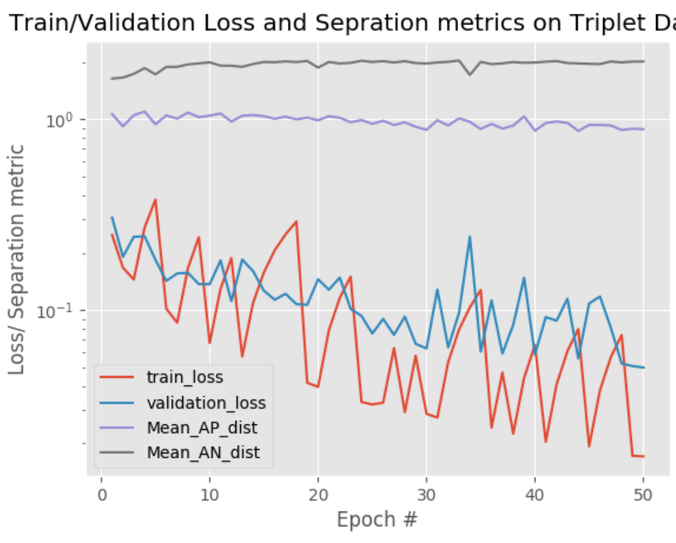
Model and loss function

- Using a Siamese model to be trained on triplet image input sets (anchor, positive, negative) and triplet loss function
- Transfer learning from VGG-16 model (trained on ImageNet) to provide 4096 D face image encodings with 3 trainable FC layers outputting 128 D descriptor for each image in triplet
- Randomly generating negative example as person from another family

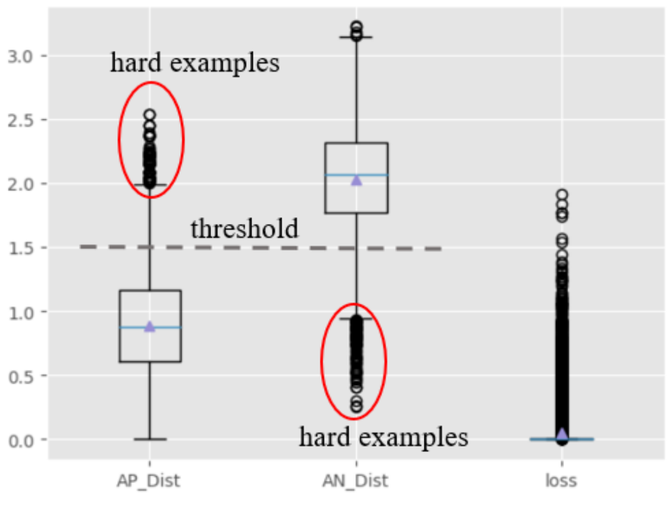


Training and validation (M-D)

Loss and separation metrics with epochs



Separation metric distribution as box plot



Confusion matrix for verification task

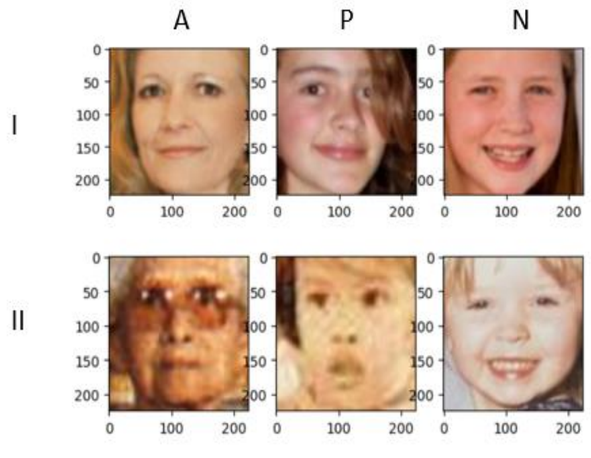
Predicted \ Actual	M-D (Y)	M-D (N)
M-D (Y)	7639	995
M-D (N)	736	7380

N_Triplet = 8375

accuracy, precision, recall and F1 values 89.7%, 88.4%, 91.2% and 89.8 %

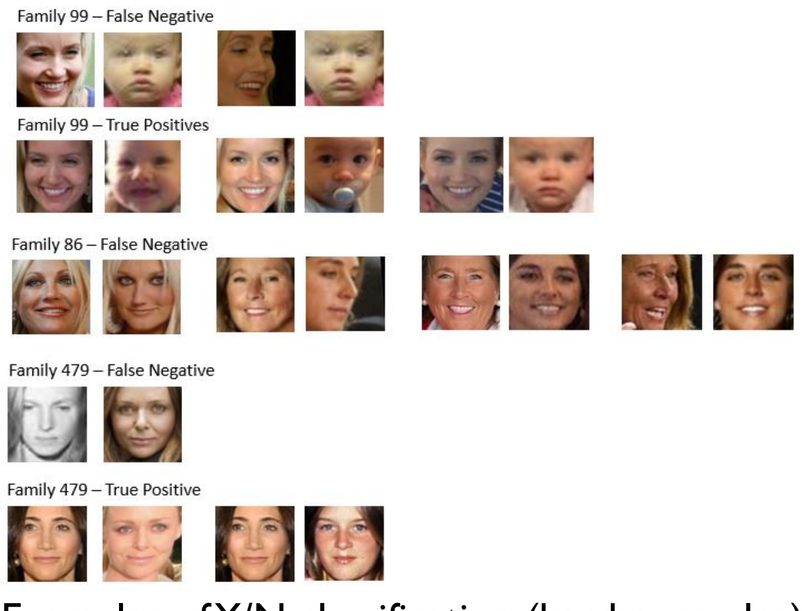
Results and future work

Examples of successful verification



AP = 1.0247
AN = 1.8423

AP = 0.6492
AN = 2.2919



Examples of Y/N classification (hard examples)

- Good performance …
- Oscillating Loss

Future work

- Train other relationships
- Test on data from other datasets
- Compare to published results

[1] https://web.northeastern.edu/smilelab/RFIW2018/