Face recognition

Triplet loss

Learning Objective
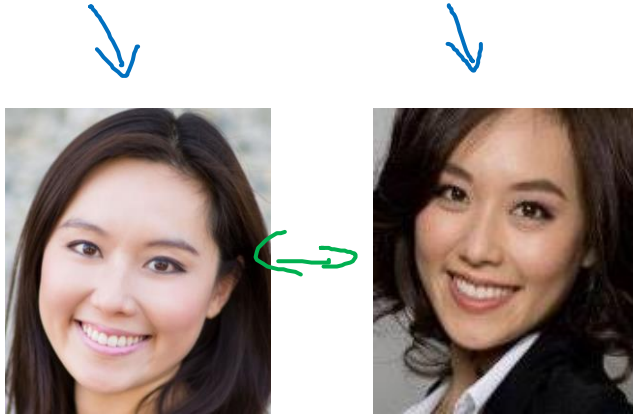
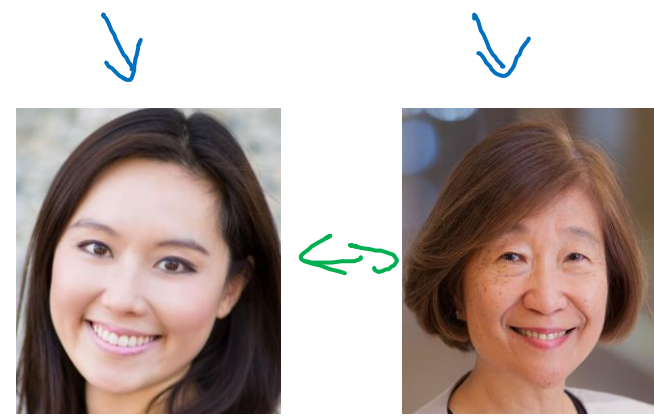Anchor Positive   Anchor Negative

A $d(A,P)=0.5$ P A $d(A,N)=0.5$ 0.7 N

Want:

$$\underbrace{\| f(A) - f(P) \|^2}_{d(A,P)} + \alpha \overset{\nearrow 0.2}{\leq} \underbrace{\| f(A) - f(N) \|^2}_{d(A,N)}$$

$$\boxed{\underbrace{\| f(A) - f(P) \|^2}_{0} - \underbrace{\| f(A) - f(N) \|^2}_{0} + \underbrace{\alpha}_{margin} \leq 0}$$

$f(img) = \vec{0}$

[Schroff et al.,2015, FaceNet: A unified embedding for face recognition and clustering]

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Loss function

Given 3 images A, P, N:

$$\mathcal{L}(A, P, N) = \max\left(\|f(A) - f(P)\|^2 - \|f(A) - f(N)\|^2 + \alpha, 0\right)$$

$\leq 0 \quad > 0$

$$J = \sum_{i=1}^{m} \mathcal{L}(A^{(i)}, P^{(i)}, N^{(i)})$$

A, P

Training set: 10k pictures of 1k persons

[Schroff et al., 2015, FaceNet: A unified embedding for face recognition and clustering]   Andrew Ng

Choosing the triplets A,P,N

During training, if A,P,N are chosen randomly,
$d(A, P) + \alpha \leq d(A, N)$ is easily satisfied.

$$\|f(A) - f(P)\|^2 + \alpha \leq \|f(A) - f(N)\|^2$$

Choose triplets that're "hard" to train on.

$$d(A,P) + \alpha \leq d(A,N)$$

$$d(A,P) \approx d(A,N)$$

Face Net

Deep Face

[Schroff et al.,2015, FaceNet: A unified embedding for face recognition and clustering]
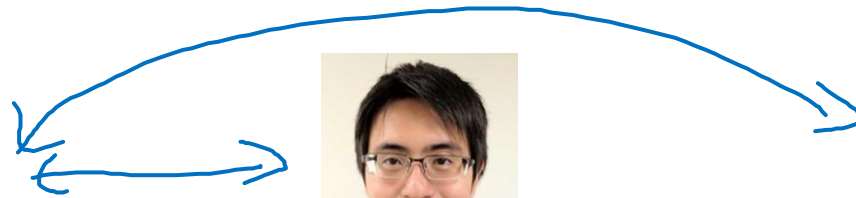
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Training set using triplet loss

Anchor　　　　Positive　　　　Negative

J

$d(x^{(i)}, x^{(j)})$

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