Face recognition

Triplet loss

(A, P, N)

deeplearning.ai

Learning Objective
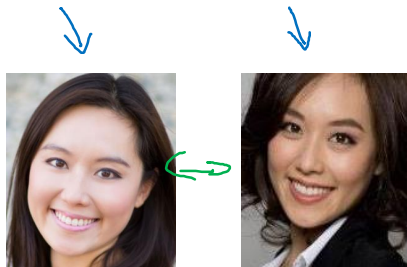
Anchor — A   Positive — P

$d(A,P) = \boxed{0.5}$

Anchor — A   Negative — N

$d(A,N) = \cancel{0.51}\;\boxed{0.7}$

Want:

$$\underbrace{\|f(A) - f(P)\|^2}_{d(A,P)} + \alpha \;\le\; \underbrace{\|f(A) - f(N)\|^2}_{d(A,N)}$$

$\nearrow 0.2$

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

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

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

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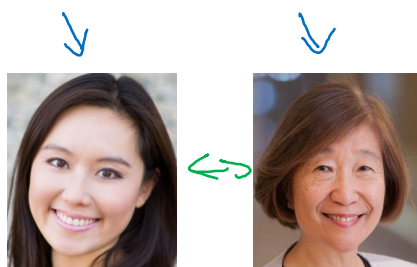
Loss function

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]

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Choosing the triplets A,P,N

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

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

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

2个人的图像

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

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

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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