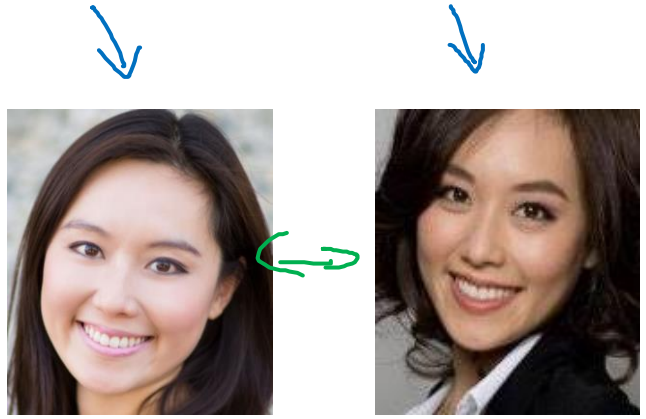
deeplearning.ai

Face recognition

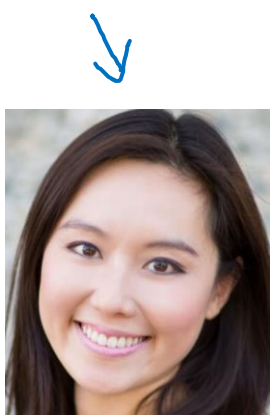
Triplet loss

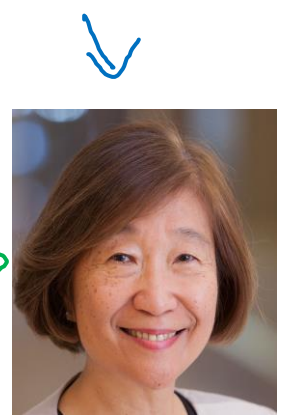
Learning Objective



Anchor

Positive





Anchor

Negative

A

$d(A,P) = 0.5$ P

A

$d(A,N) = 0.5$ N $\rightarrow 0.7$

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

$$\|f(A) - f(P)\|^2 - \|f(A) - f(N)\|^2 + \alpha \leq 0$$

$\|f(A) - f(P)\|^2 \geq 0$ $\quad \|f(A) - f(N)\|^2 \geq 0$ $\quad \alpha$: margin

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

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

Loss function

Given 3 images A, P, N:

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

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

A, P

Training set: 10k pictures of 1k persons

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

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]

Training set using triplet loss