

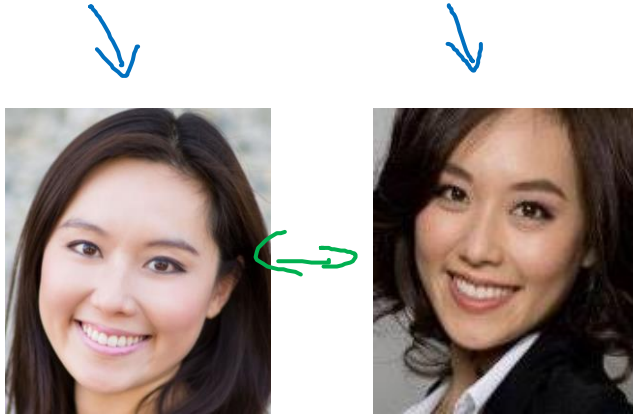


deeplearning.ai

Face recognition

Triplet loss

Learning Objective



Anchor

A

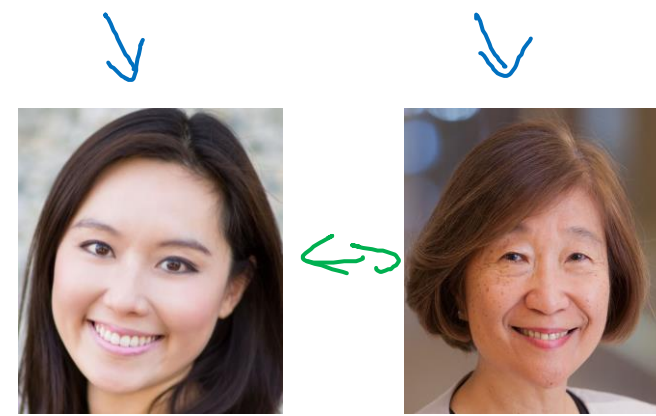
Positive

P

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

Want:

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



Anchor

A

Negative

N

$$d(A, N) = \cancel{0.5} \quad 0.7$$

$$\underbrace{\|f(A) - f(N)\|^2}_{d(A, N)}$$

$$\underbrace{\|f(A) - f(P)\|^2}_0 - \underbrace{\|f(A) - f(N)\|^2}_0 + \underline{\alpha} \leq \underline{0} \quad \text{margin}$$

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

Loss function

Given 3 images

A, P, N :

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

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

A, P
↑ ↑

Training set: 10k pictures of 1k persons

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.

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

↓ ↑

Face Net
Deep Face

Training set using triplet loss

Anchor



⋮



Positive



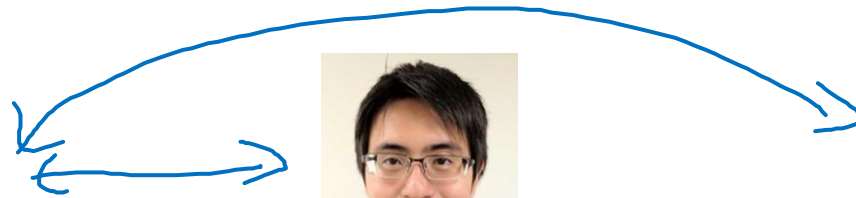
⋮



Negative



⋮



J

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