

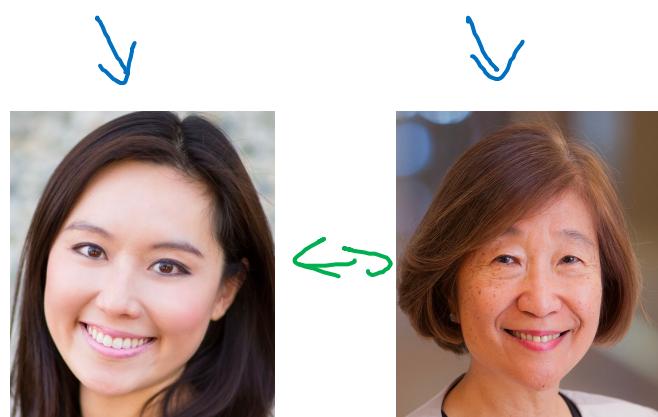
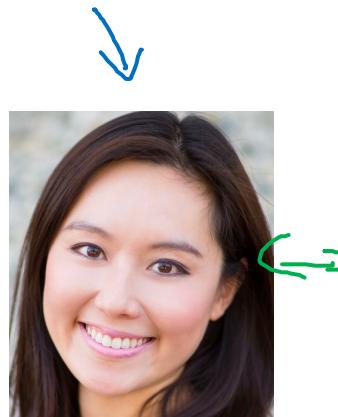


deeplearning.ai

Face recognition

Triplet loss

Learning Objective



Anchor

A

Positive

$d(A, P) = 0.5$

Want:

$$\frac{\|f(A) - f(P)\|^2}{d(A, P)} + \alpha \leq 0.2$$

Anchor

A

Negative

$d(A, N) = 0.5$ 0.7

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

$$\frac{\|f(A) - f(P)\|^2}{\textcircled{0}} - \frac{\|f(A) - f(N)\|^2}{\textcircled{0}} + \alpha \leq \textcircled{0} \quad \text{Margin}$$

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

Loss function

Given 3 images

A, P, N :

$$\underline{L(A, P, N)} = \max \left(\left[\|f(A) - f(P)\|^2 - \|f(A) - f(N)\|^2 + \lambda \right], 0 \right)$$

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

A, P
 T

Training set: $\underbrace{10k}_{\infty}$ pictures of $\frac{1k}{\infty}$ 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.

$$\underbrace{\|f(A) - f(P)\|^2}_{\text{Distance between } A \text{ and } P} + \alpha \leq \underbrace{\|f(A) - f(N)\|^2}_{\text{Distance between } A \text{ and } N}$$

Choose triplets that're “hard” to train on.

$$\begin{aligned} \cancel{d(A, P)} + \alpha &\leq \cancel{d(A, N)} \\ \frac{d(A, P)}{\downarrow} &\approx \frac{d(A, N)}{\uparrow} \end{aligned}$$

Face Net
Deep Face



Training set using triplet loss

Anchor



Positive



Negative



:



:



:



J

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