神经网络第十三章

What is Neural Style Transfer?

画风：神经网络转换

What are deep ConvNets Learning?

$224 \times 224 \times 3$ → $110 \times 10 \times 96$ → $55 \times 55 \times 96 \times 256$ → 26×26 → $13 \times 13 \times 256$ → $13 \times 13 \times 384$ → $6 \times 6 \times 256$
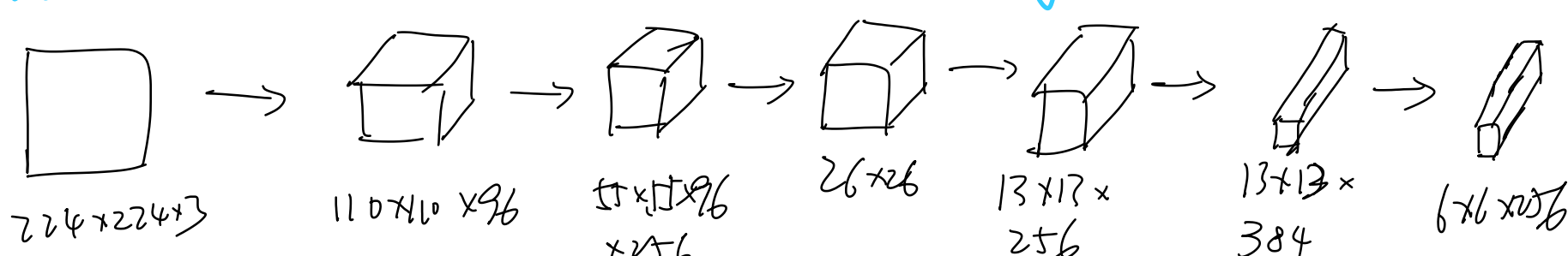
Cost Function

Content C + Style S

$J(G) = \alpha J_{content}(C, G) + \beta J_{style}(S, G)$

↓

Generated image G

1. Initiate G randomly (G为想要图片)

  G : $100 \times 100 \times 3$

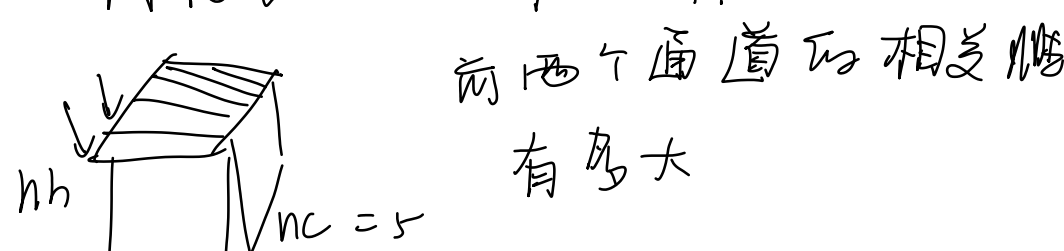2. Use GD to minimize J(G)

  $G := G - \dfrac{\alpha}{2G} J(G)$

Content Cost Function

$J_{content}(C, G) = \frac{1}{2} \| a^{[l](C)} - a^{[l](G)} \|^2$

Style Cost Function

风格？

风格定义为不同激活通道之间的相关系数.

前两个通道的相关性

有多大

n_H n_W $n_C = 5$

高度相关：纹理元素/底色元素.

style matrix

Let $a^{[l]}_{i,j,k}$ = activation at (i, j, k)

$G^{[l]}$ is $n_c^{[l]} \times n_c^{[l]}$ (K 和 k')

$G^{[l](S)}_{KK'} = \sum_{i=1}^{n_H^{[l](S)}} \sum_{j=1}^{n_W^{[l](S)}} a_{ijk} a_{ijk'}$ "gram matrix"

$G^{[l](G)}_{KK'} = \sum_{i=1}^{n_H^{[l](G)}} \sum_{j=1}^{n_W^{[l](G)}} a_{ijk}^{[l](G)} a_{ijk'}^{[l](G)}$
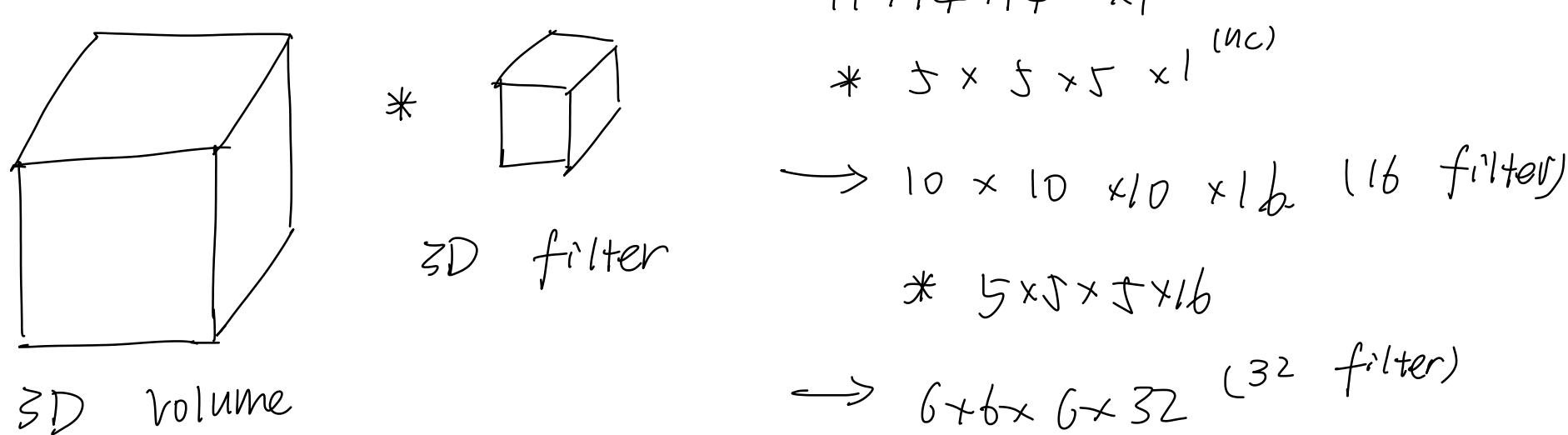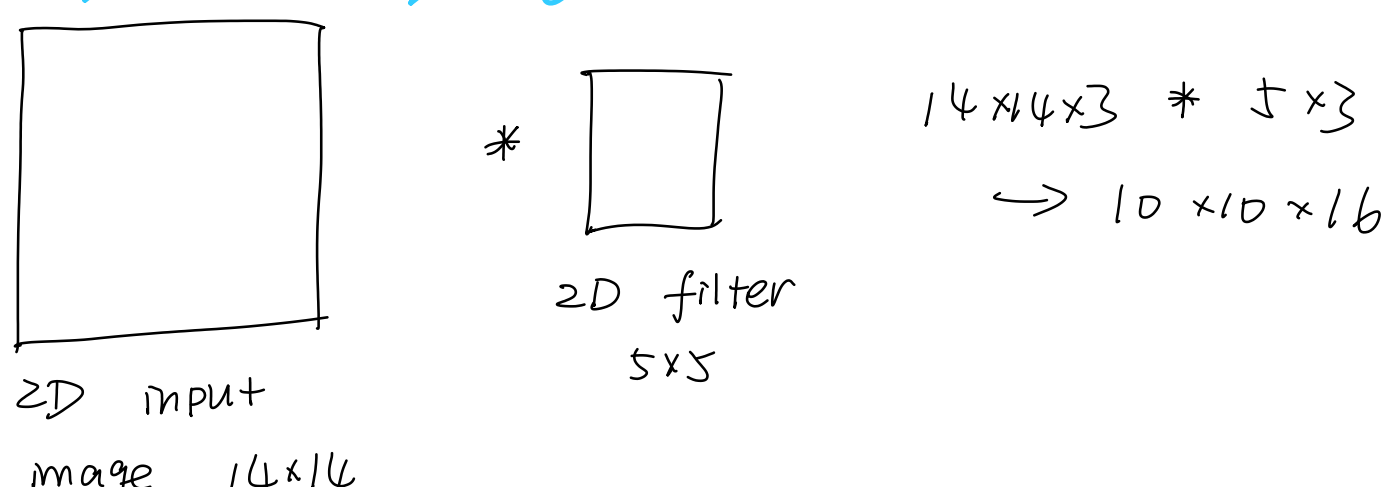
$J_{style}^{[l]}(S, G) = \| G^{[l](S)} - G^{[l](G)} \|_F^2$

$J_{style}(S, G) = \sum_l \lambda^{[l]} J_{style}^{[l]}(S, G)$

$J(G) = \alpha J_{content}(C, G) + \beta J_{style}(S, G)$

"使其尽可能小"

1D and 3D Generalization

2D input image 14×14

* 2D filter 5×5

$14 \times 14 \times 3$ * 5×3

$\longrightarrow 10 \times 10 \times 16$

3D volume

* 3D filter

$14 \times 14 \times 14 \times 1$ (nc)

* $5 \times 5 \times 5 \times 1$ (nc)

$\longrightarrow 10 \times 10 \times 10 \times 16$ (16 filter)

* $5 \times 5 \times 5 \times 16$

$\longrightarrow 6 \times 6 \times 6 \times 32$ (32 filter)

What is Face Recognition?

{ Verification 1:1

{ Recognition. 1:K

One Shot Learning

看过一次脸认出此人 ...

soft max ✗ $d(img1, img2)$ = degree of difference

If $d(img1, img2) \leq \tau$

Siamese Network

$d(x^{(i)}, x^{(2)}) = \| f(x^{(i)}) - f(x^{(2)}) \|_2^2$

Triplet Loss

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

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

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

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

$\hat{y} = \sigma \left(\sum_{k=1}^{128} w_i | f(x^{(i)})_k - f(x^{(j)})_k | + b \right)$