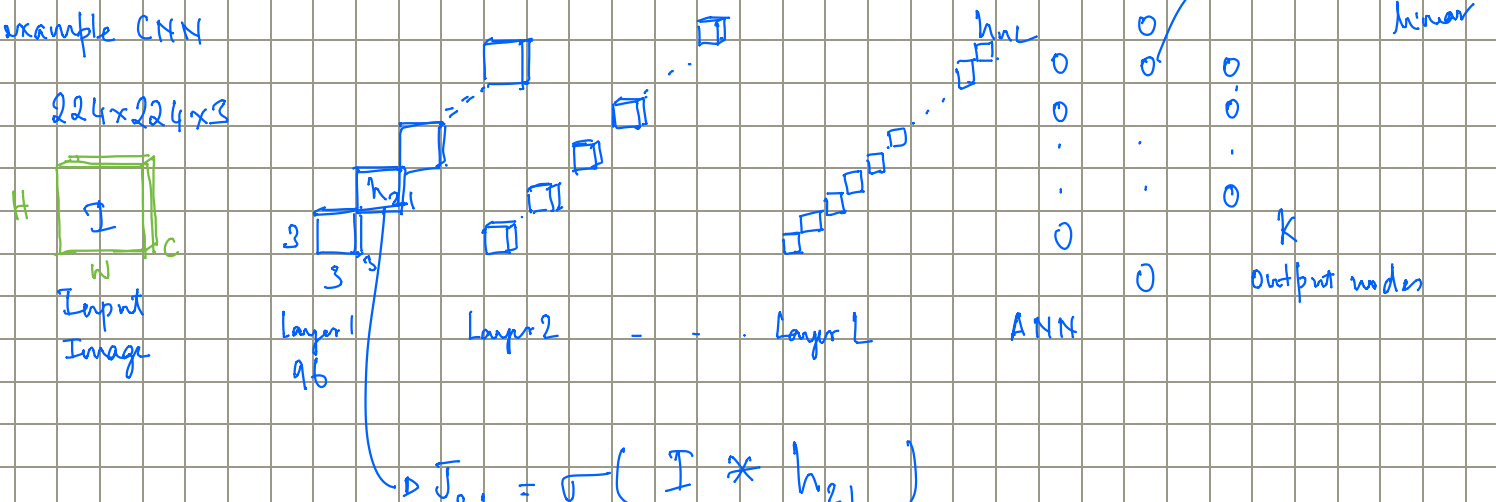
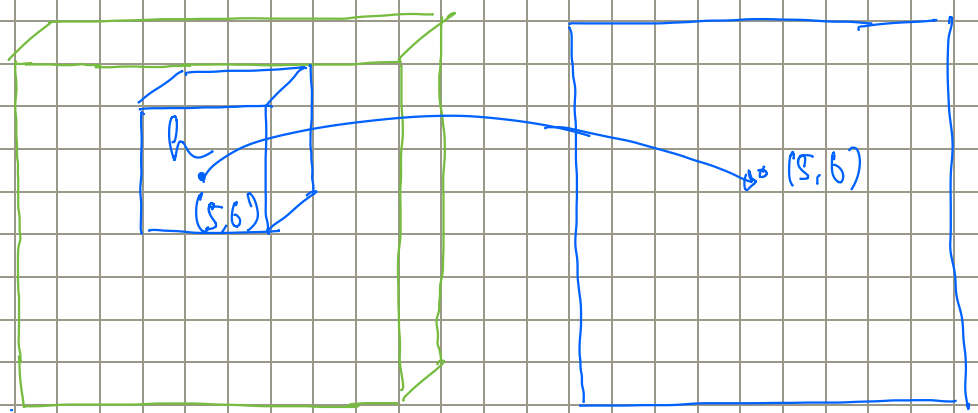
26/09/23 Deep Learning

- Recap: Optimization techniques of DL algos ✓
- Introduction to Convolutional Neural Networks (CNNs)
  - Motivation: human vision, weight sharing, representation learning ✓
  - Convolution operation ✓
  - Convolutional neural network (CNN) ✓
  - Example CNN - AlexNet ✓

An example CNN



$J_{21} = \sigma(I * h_{21})$ ↳ convolution operation



$$K[m,n] = \sum_{c=1}^{C} \sum_{i=1}^{l} \sum_{j=1}^{l} h[i,j,c]\, I[m-i, n-j, c] \quad \text{(convolution)}$$

$$K[m,n] = \sum_{c=1}^{C} \sum_{i=-1}^{1} \sum_{j=-1}^{1} h[i,j,c] \cdot \underbrace{B}_{\text{windowing element}} \diamond I(m,n,c) \quad \text{(Correlation)}$$

$B \diamond I(m,n,c)$: extract a window centered at (m,n)