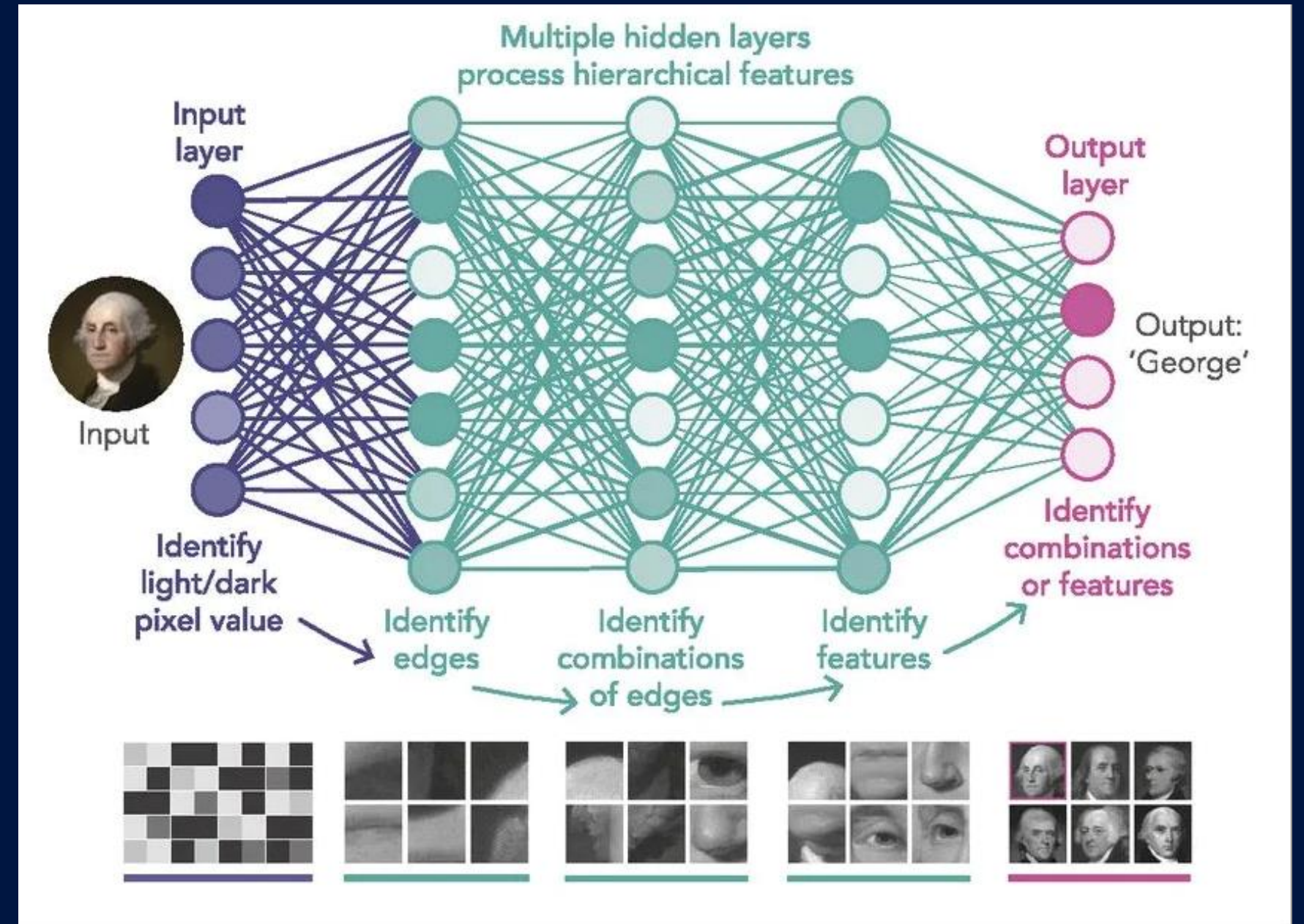


Foundations of DL in CV: Convolutional Layers

Lecturer: Mahdi S. Hosseini

Winter 2022

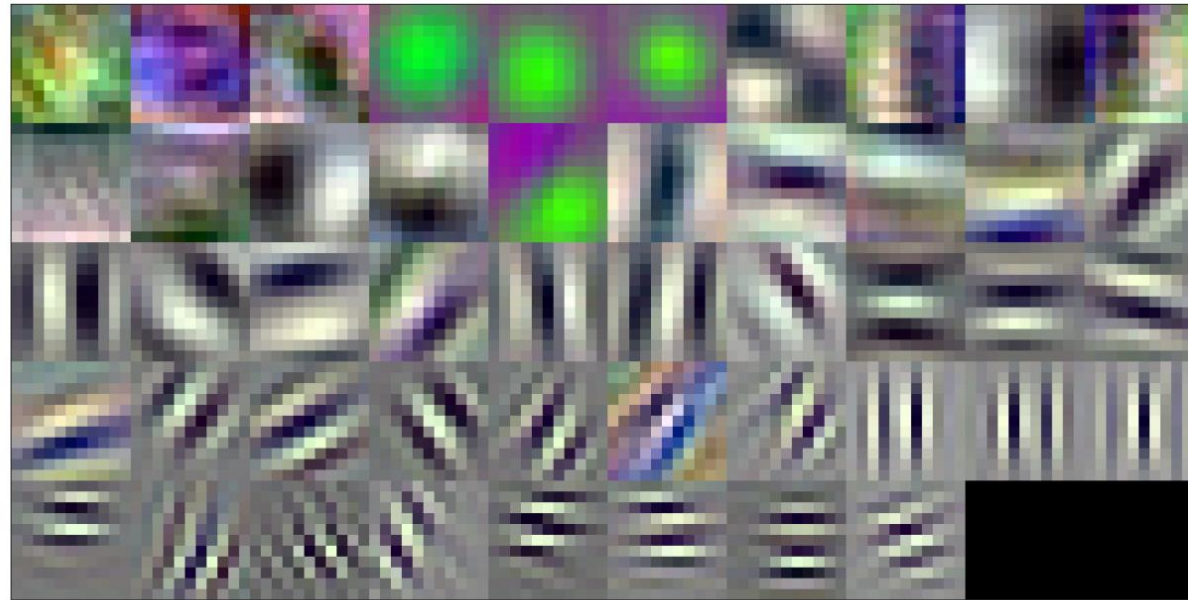


Today's Topics

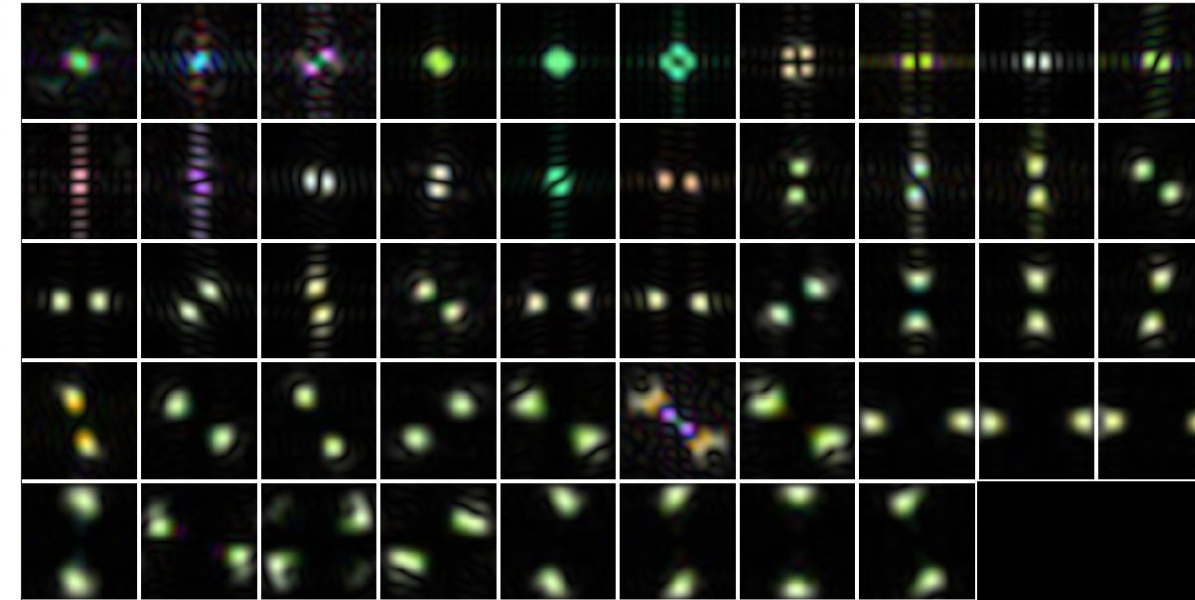
- **Convolution of Signals and Images**
- **Convolutional Layer in CNN**
- **Layers of CNN and How They Work in General?**

Convolution of Signals and Images Theorem

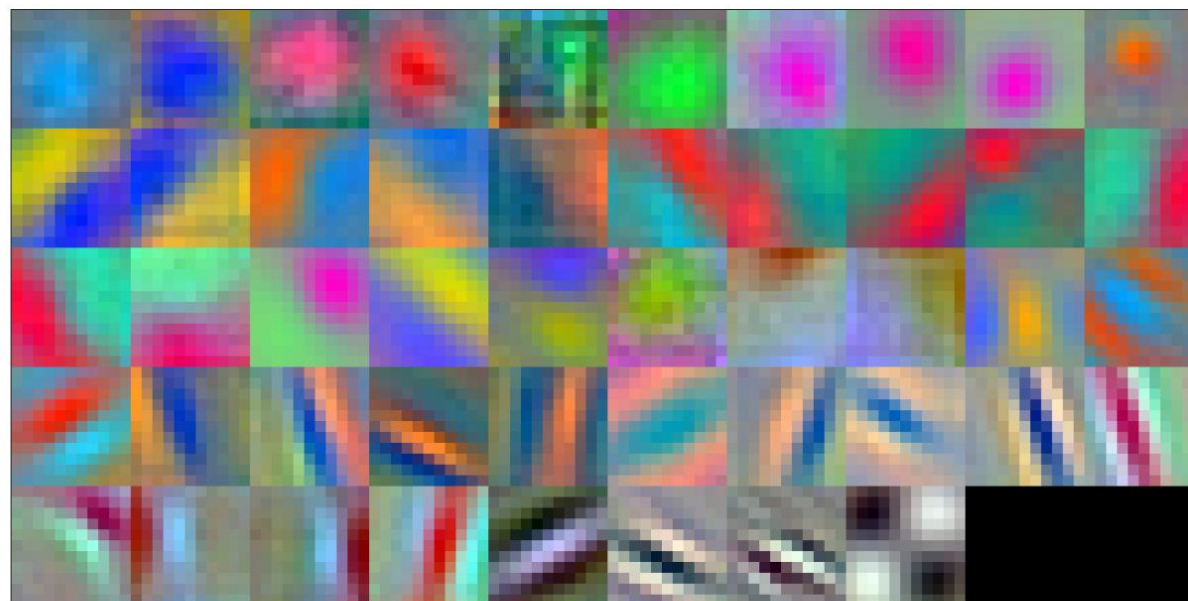
Neural Network: Convolution Filters & Responses



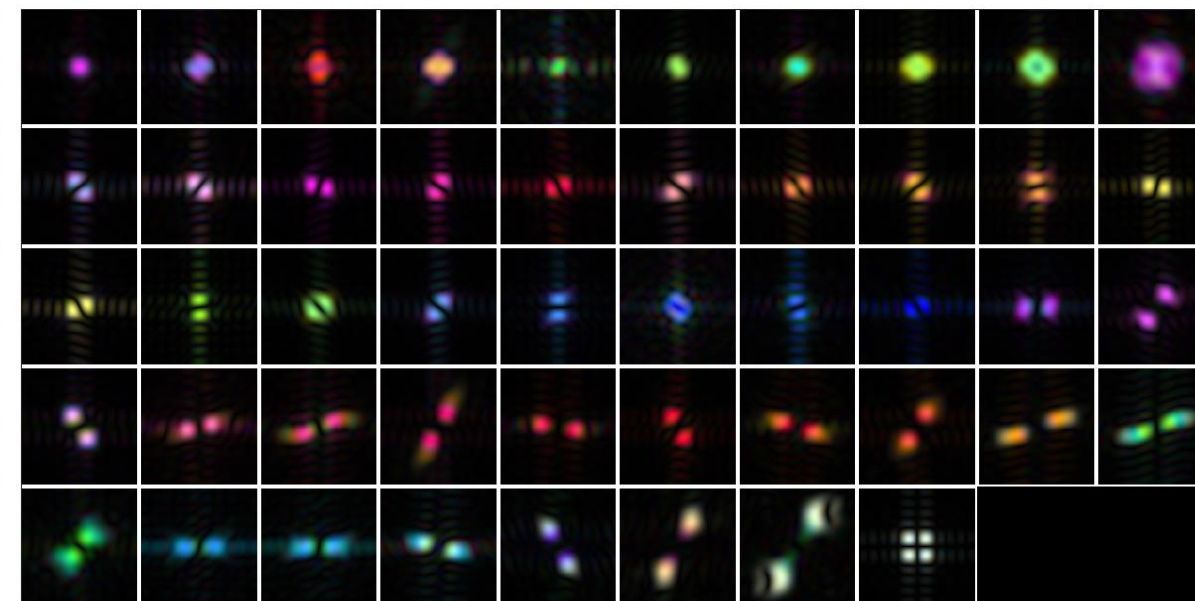
(a) impulse resp. (color-agnostic)



(b) filter resp. (color-agnostic)



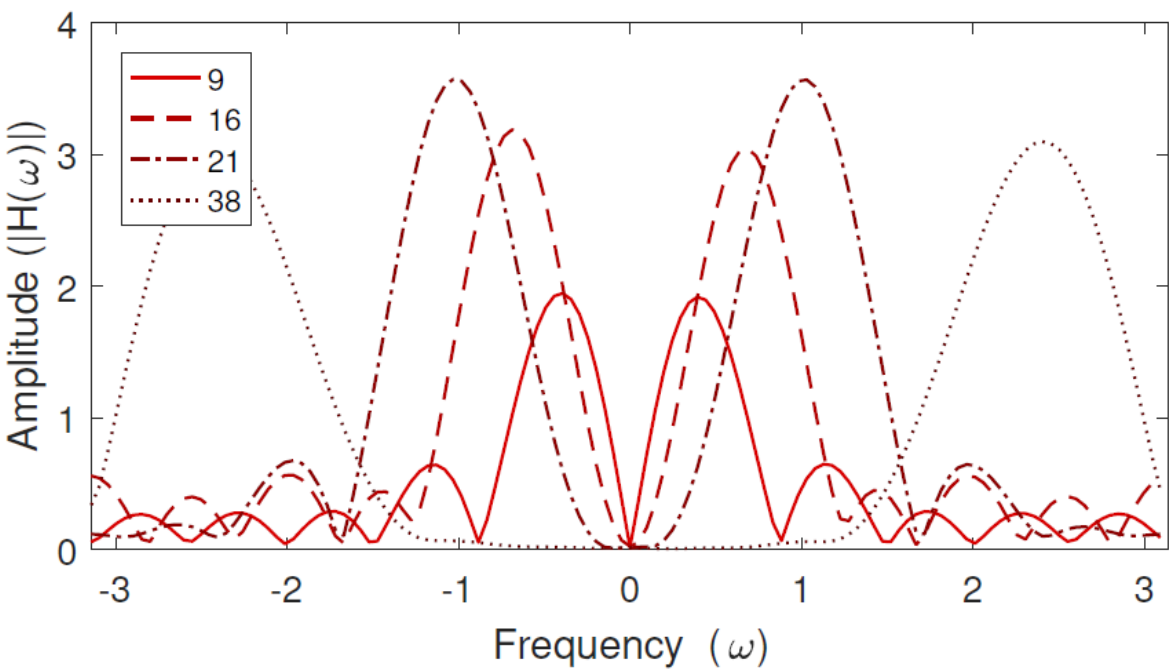
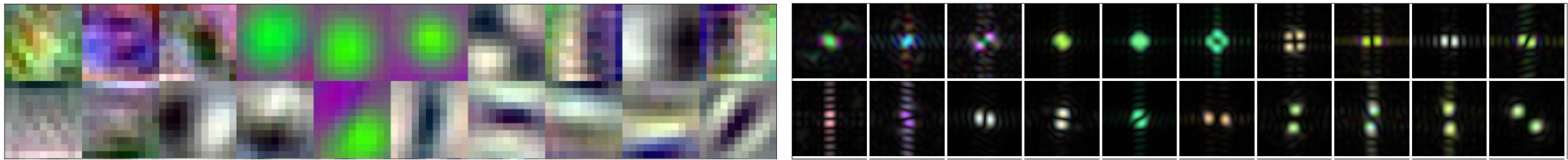
(c) impulse resp. (color-specific)



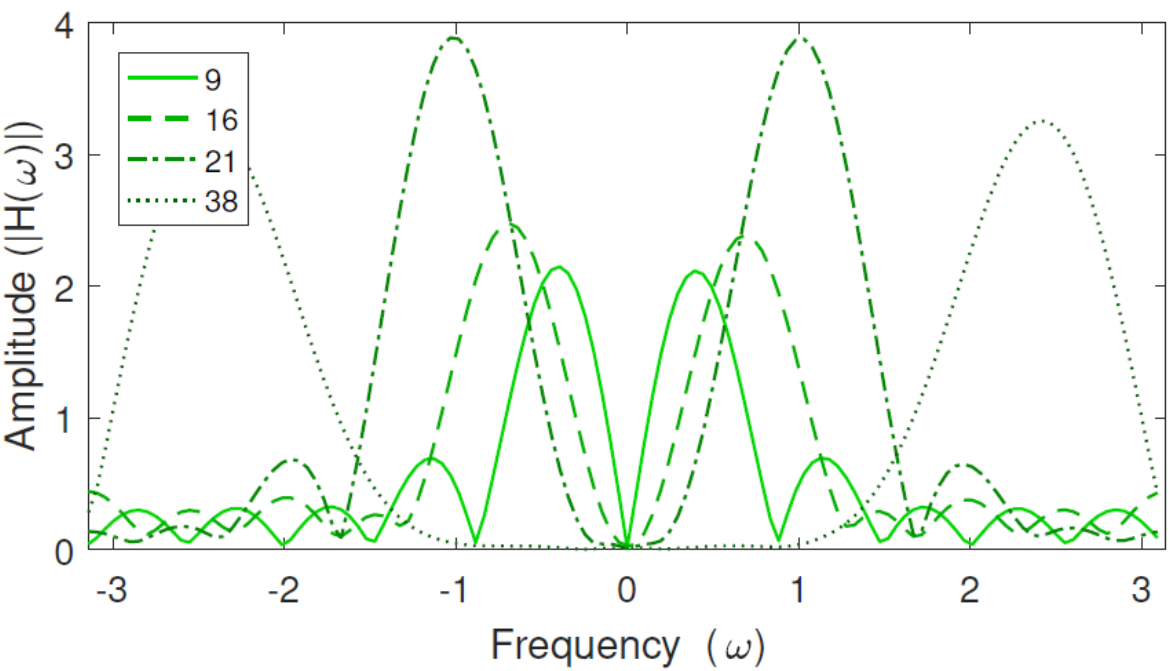
(d) filter resp. (color-specific)

Figure 1. AlexNet first layer convolution kernels for color-agnostic and color-specific sets.

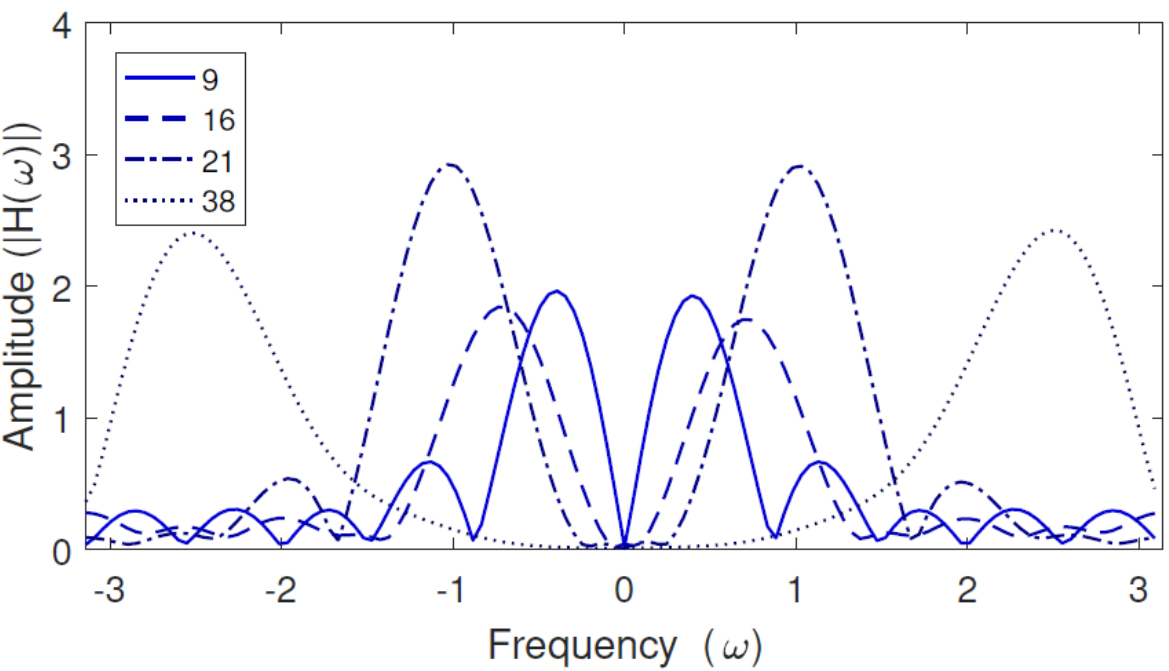
Neural Network: Convolution Filters & Responses



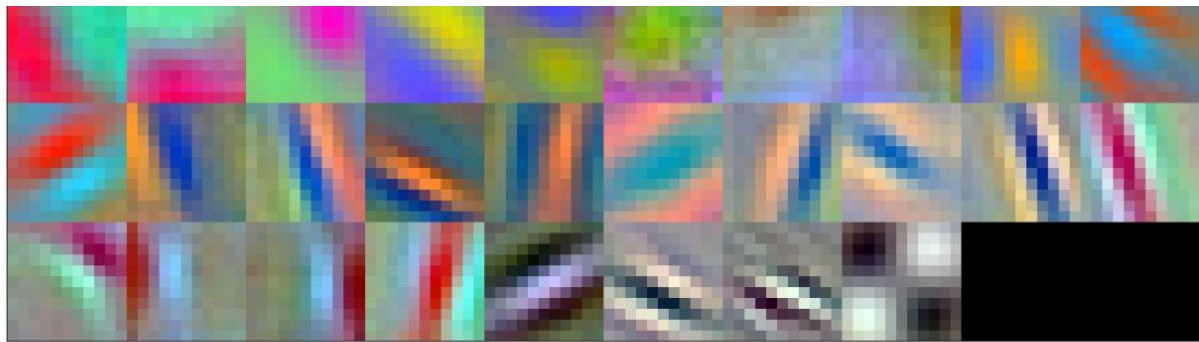
(e) Red channel



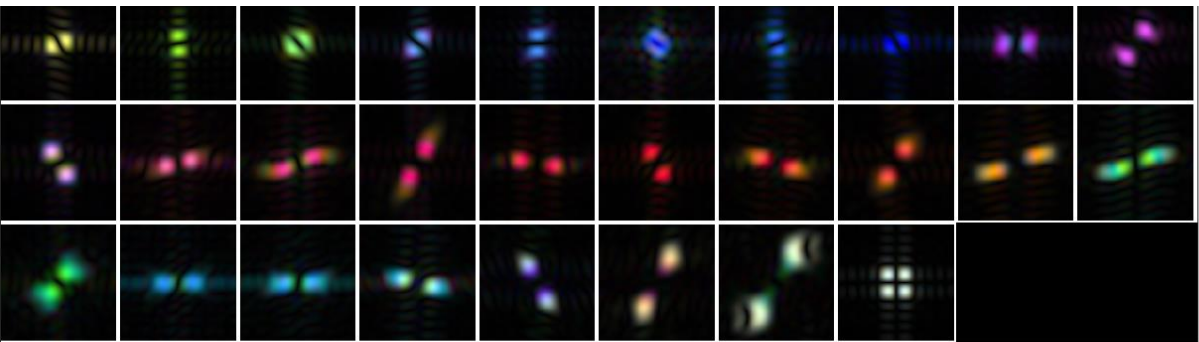
(f) Green channel



(g) Blue channel



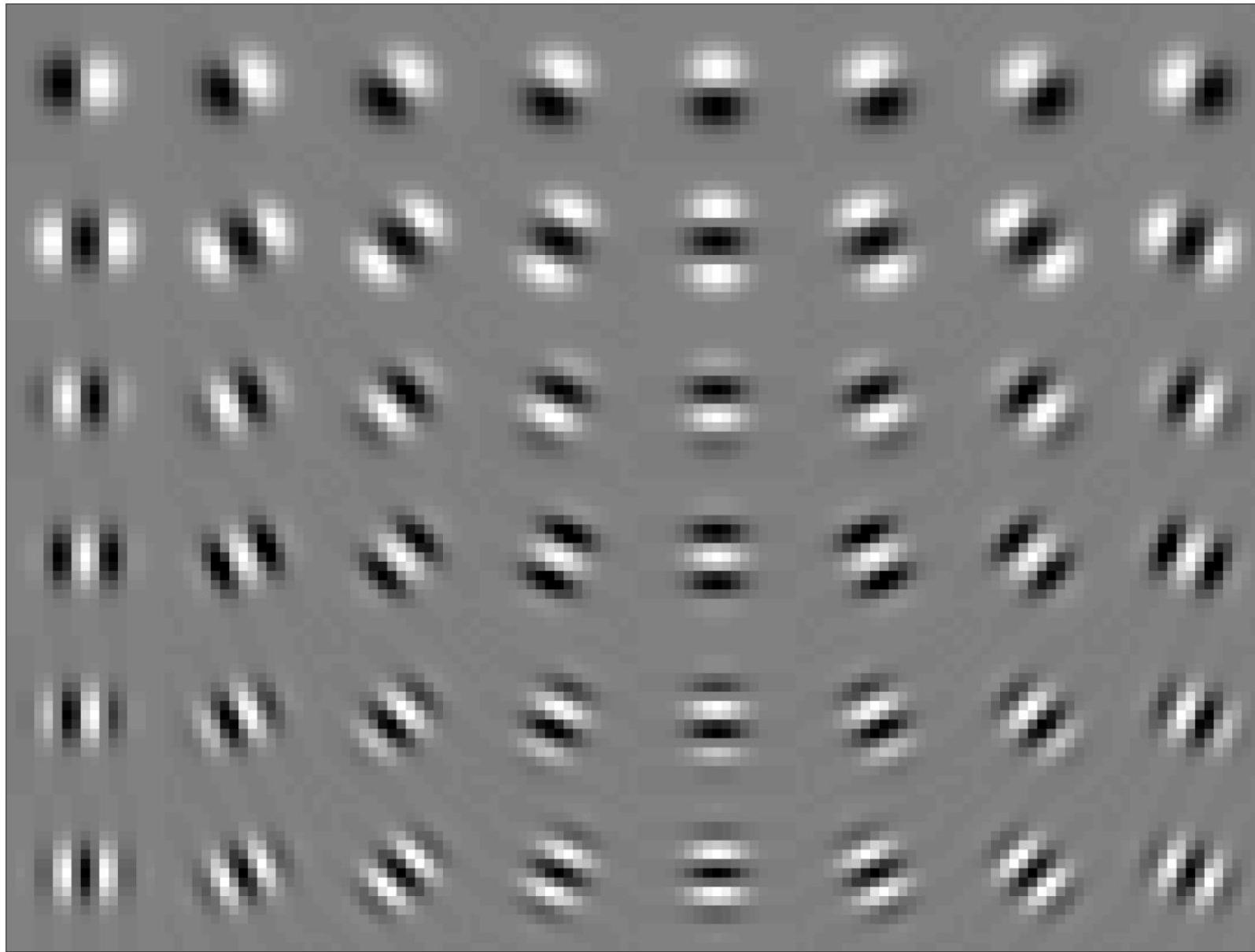
(c) impulse resp. (color-specific)



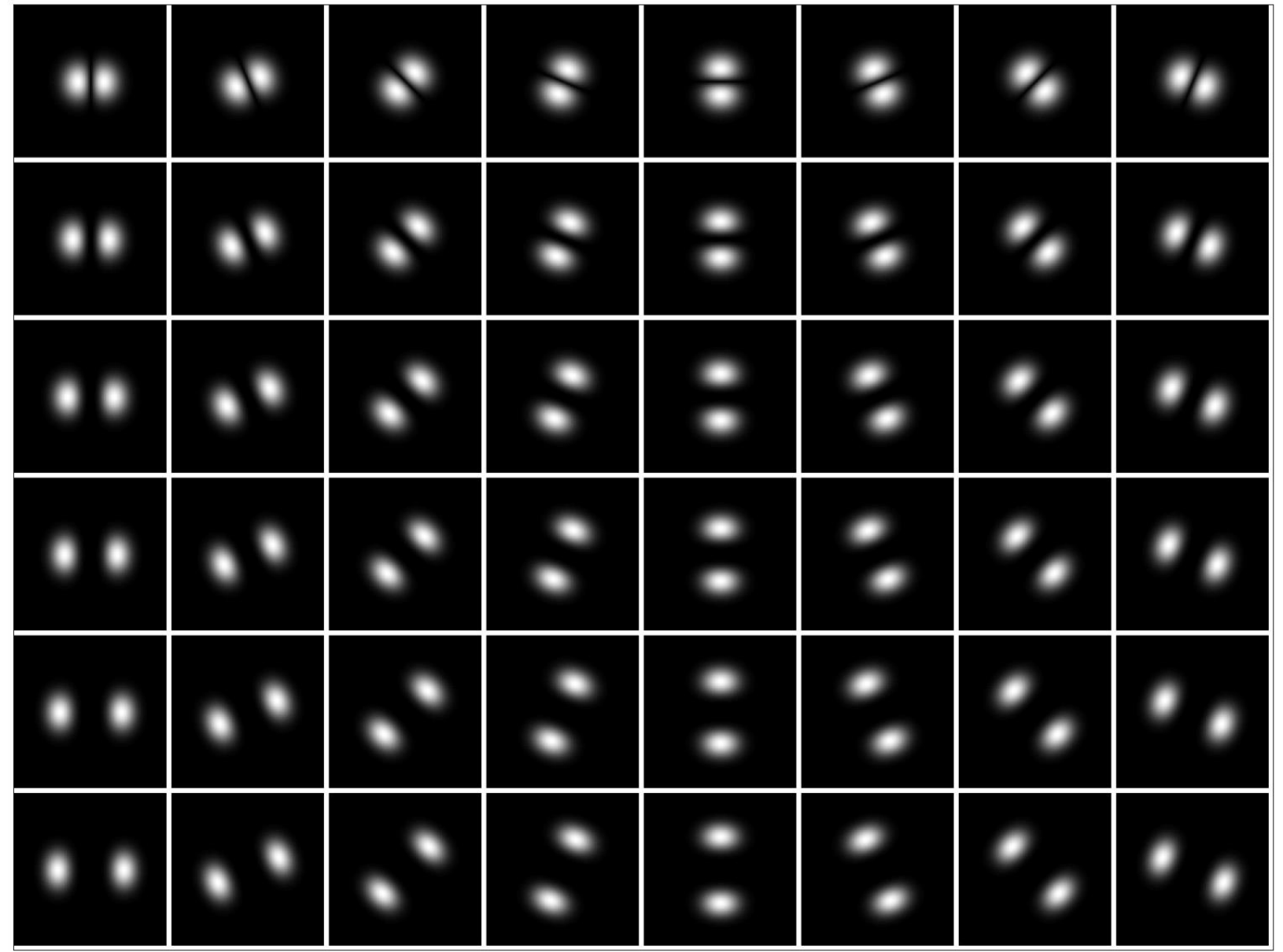
(d) filter resp. (color-specific)

Figure 1. AlexNet first layer convolution kernels for color-agnostic and color-specific sets.

Neural Network: Convolution Filters & Responses

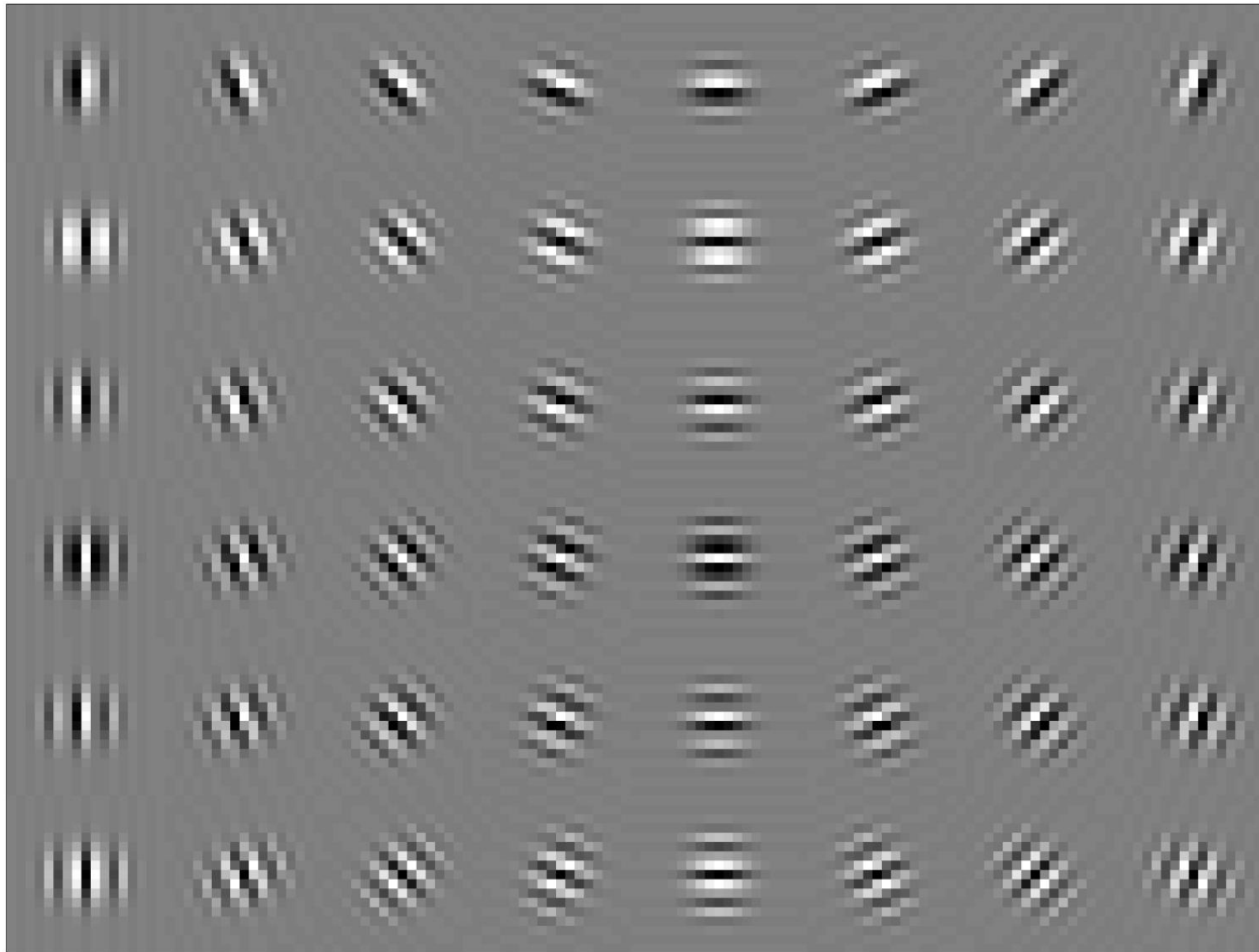


(a) impulse resp. (low cutoff)

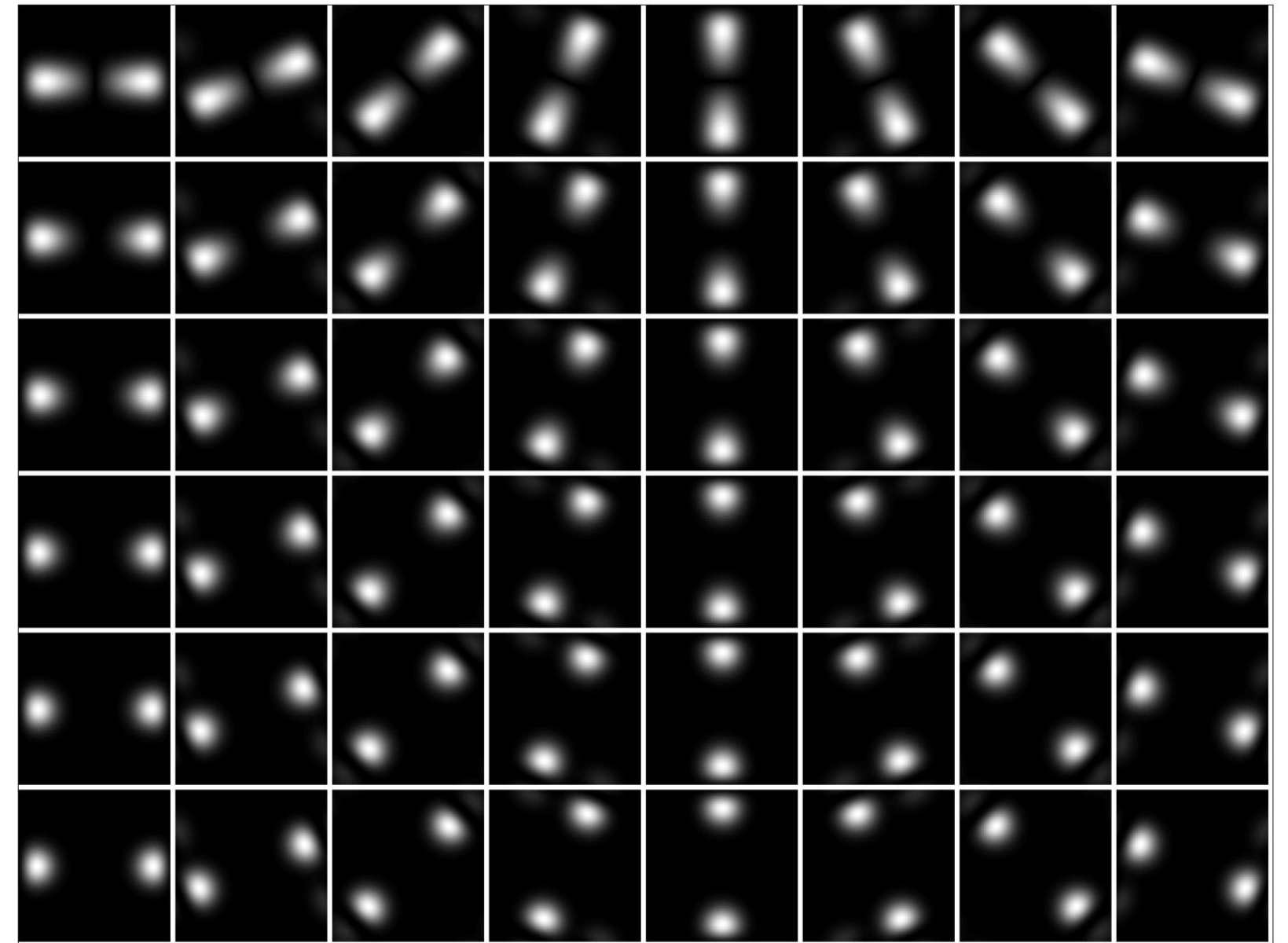


(b) filter resp. (low cutoff)

Neural Network: Convolution Filters & Responses



(c) impulse resp. (high cutoff)



(d) filter resp. (high cutoff)

Convolutional Layers in CNN