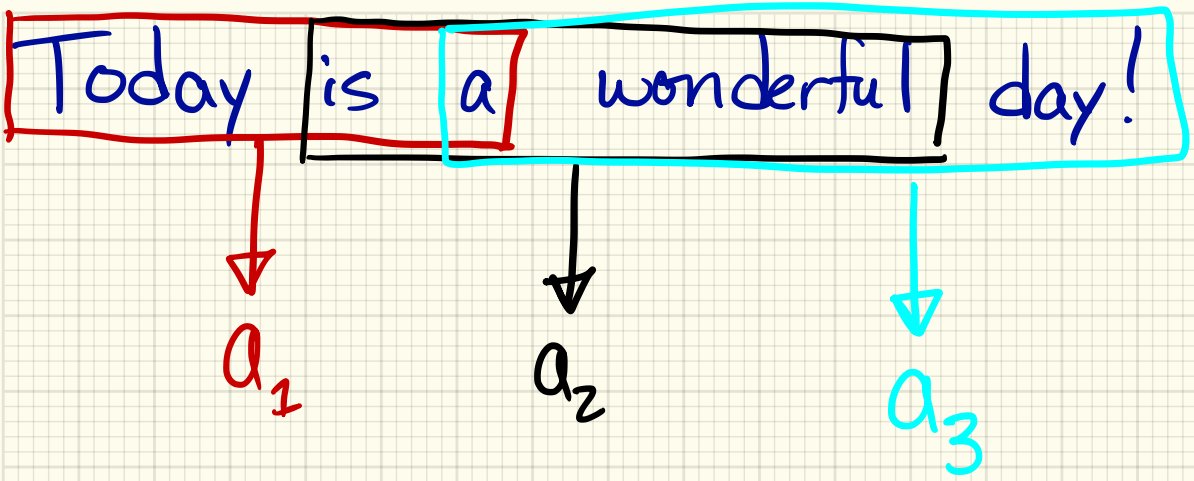
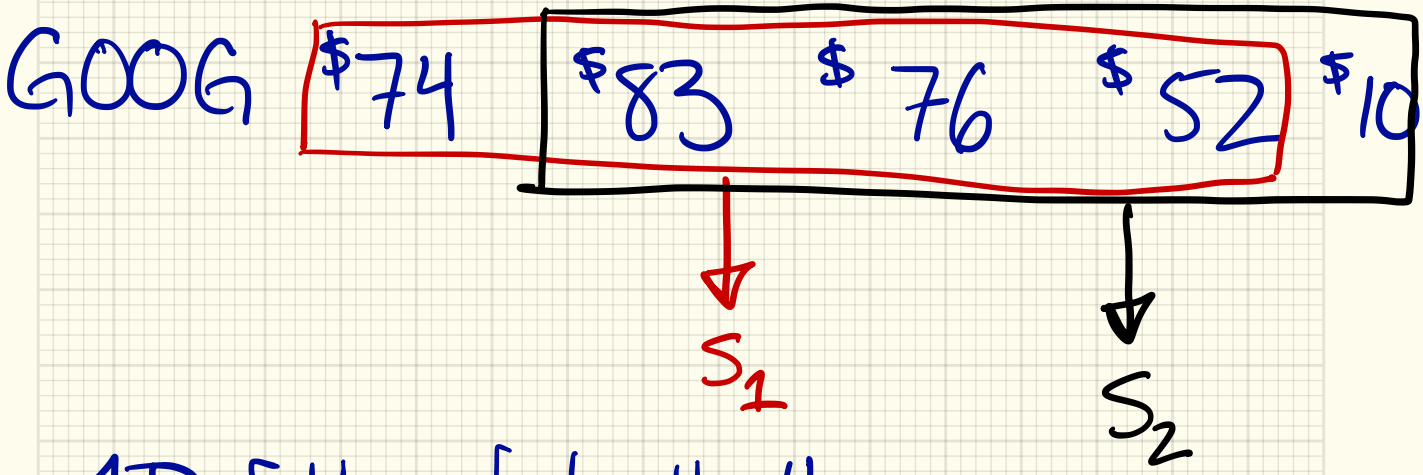
Convolutional Neural Networks (CNNs)

- commonly used with image data
  - ↳ image classification
  - ↳ object detection
  - ↳ neural style transfer
- pass filter over pixels → 2D Convolution
- can be used with any data that has "structure"



1D filter of length 3.



1D filter of length 4.

filter = [1/3 1/3 0 1/3]

CNN Structure

$$\begin{bmatrix} w_1 & w_2 & w_3 \\ w_4 & w_5 & w_6 \\ w_7 & w_8 & w_9 \end{bmatrix}$$

goal: reduce the number of parameters that we need to learn in the FC layers.

1) Convolutional
   - → # of filters
     - ↳ as # of filters ↑, # params ↑, detail ↑
   - → size of filter
     - ↳ as the size ↑, # parameters ↑, detail ↓
   - → padding
   - → stride
2) Pooling

3) Fully Connected / Densely Connected