Lecture 06 - Image Descriptors

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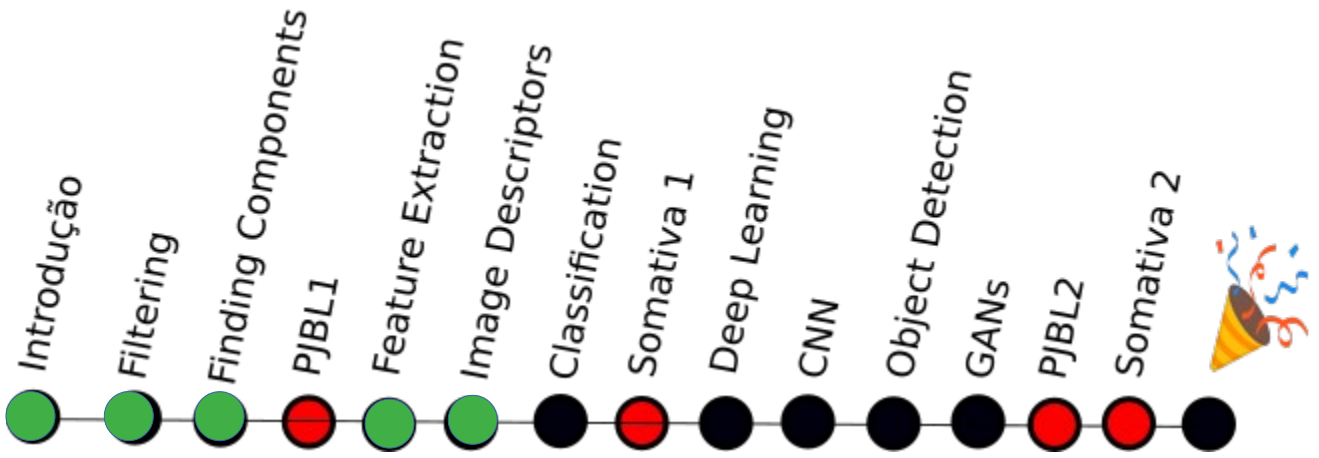
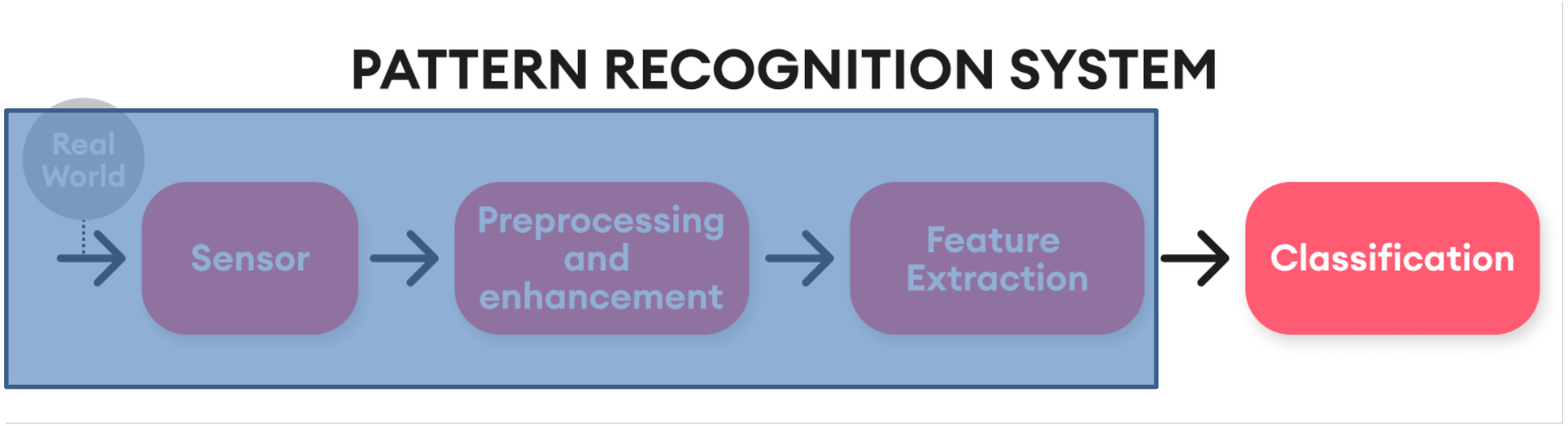
Topics

- Discussion of Lecture #05
  - Feature Vector
  - Horizontal and Vertical Projections
- Image Descriptors
- Practice

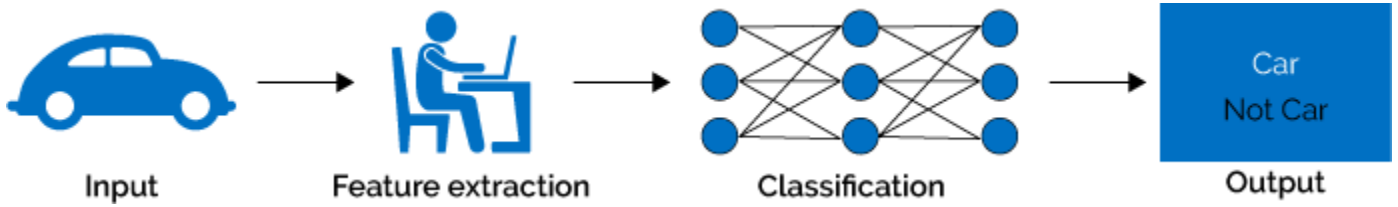


Computer Vision & Pattern Recognition Pipeline



Remembering....

- A feature descriptor translates high-dimensional data to a low dimension feature space
- A feature vector represents the input data produced by the feature descriptor
- Later, a machine learning model will learn the representations



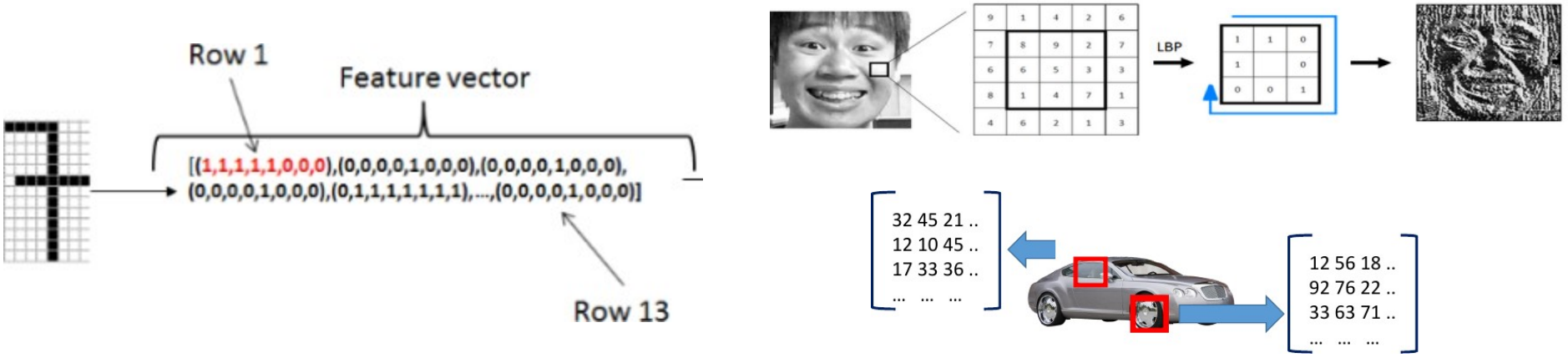
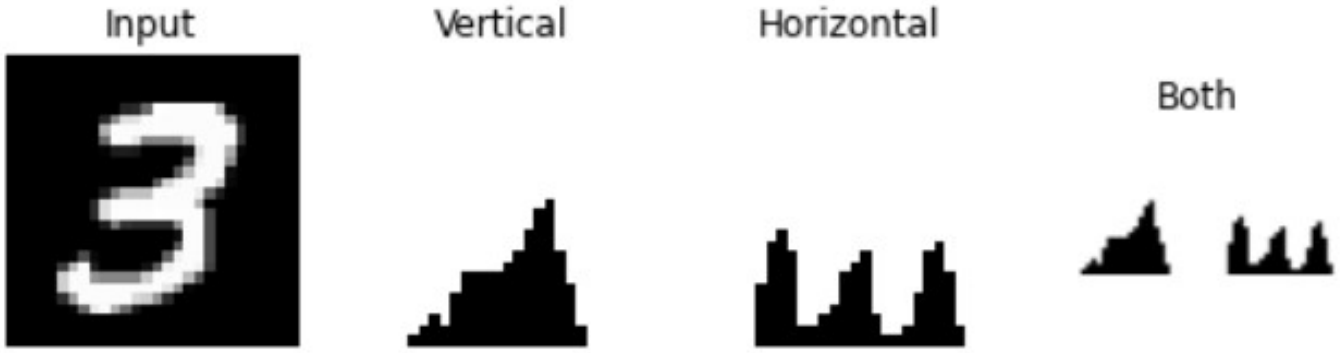


Image Descriptors – Shape / Edges

- Gradient Based
  - Projections



  - Convolutional (Filters)

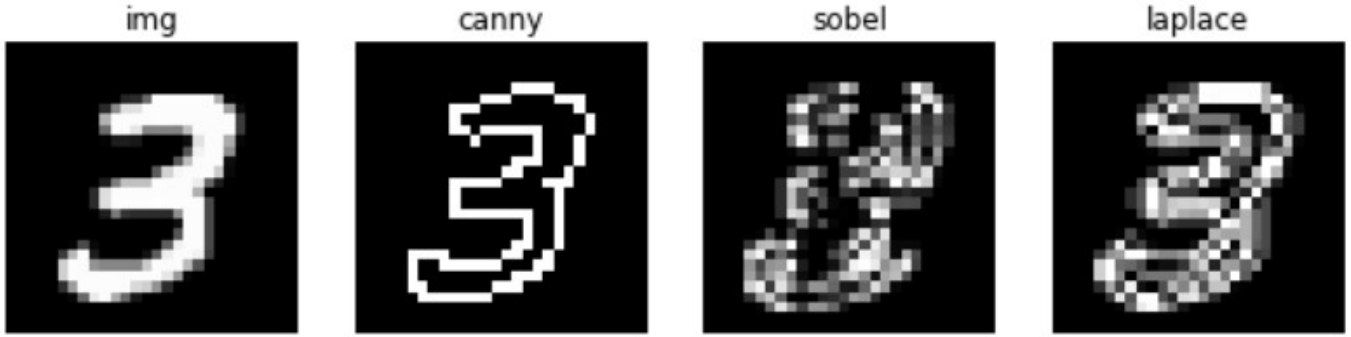
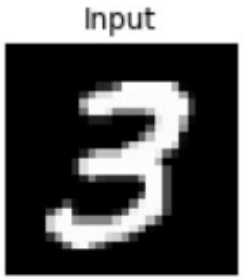
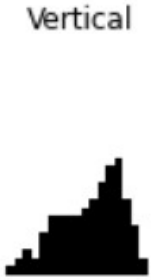


Image Descriptors – Shape / Edges

- Histogram Projection





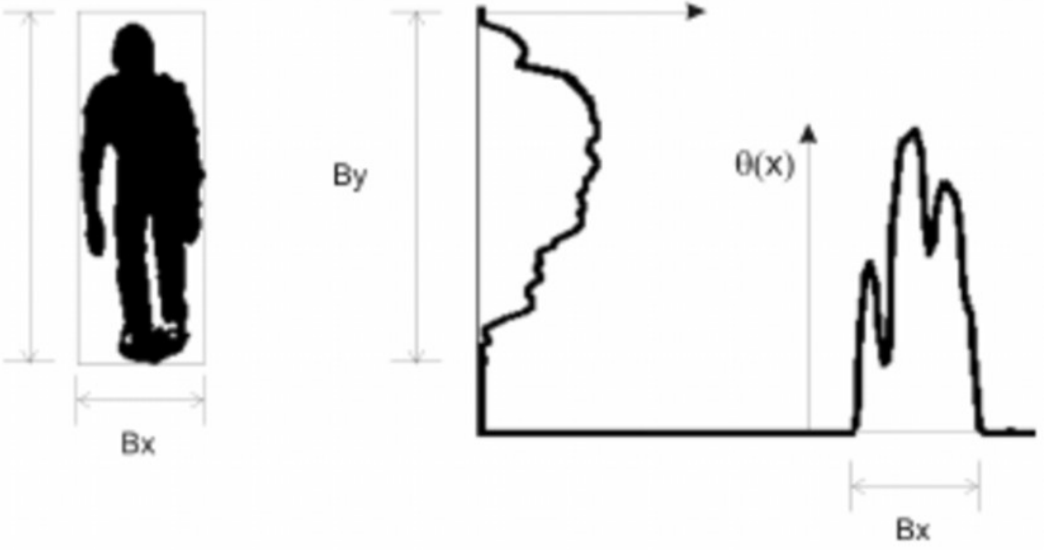


Image Descriptors – Shape / Edges

- Sobel Filter

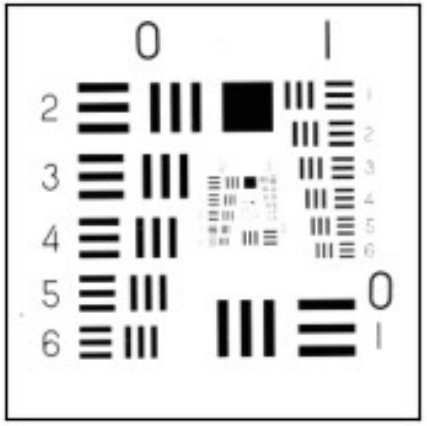
-1	0	+1
-2	0	+2
-1	0	+1

Gx

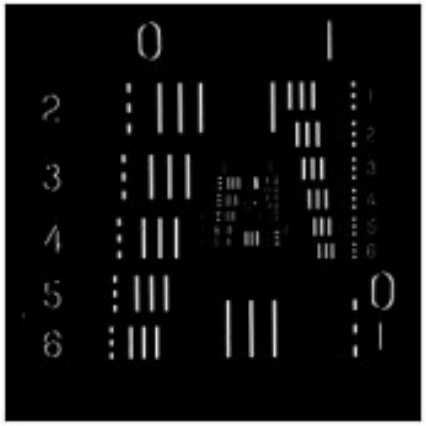
+1	+2	+1
0	0	0
-1	-2	-1

Gy

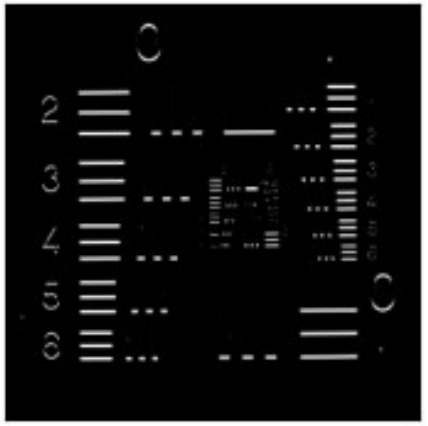
Original



x



y



Edges

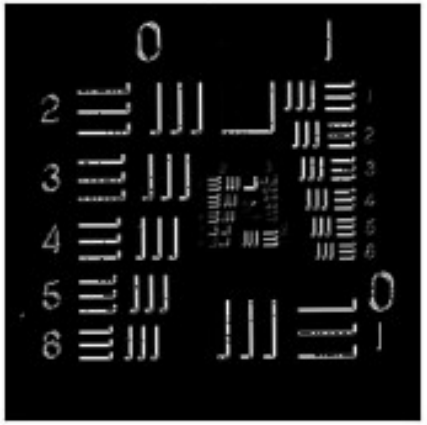


Image Descriptors – Shape / Edges

- Sobel Filter

-1	0	+1
-2	0	+2
-1	0	+1

Gx

+1	+2	+1
0	0	0
-1	-2	-1

Gy

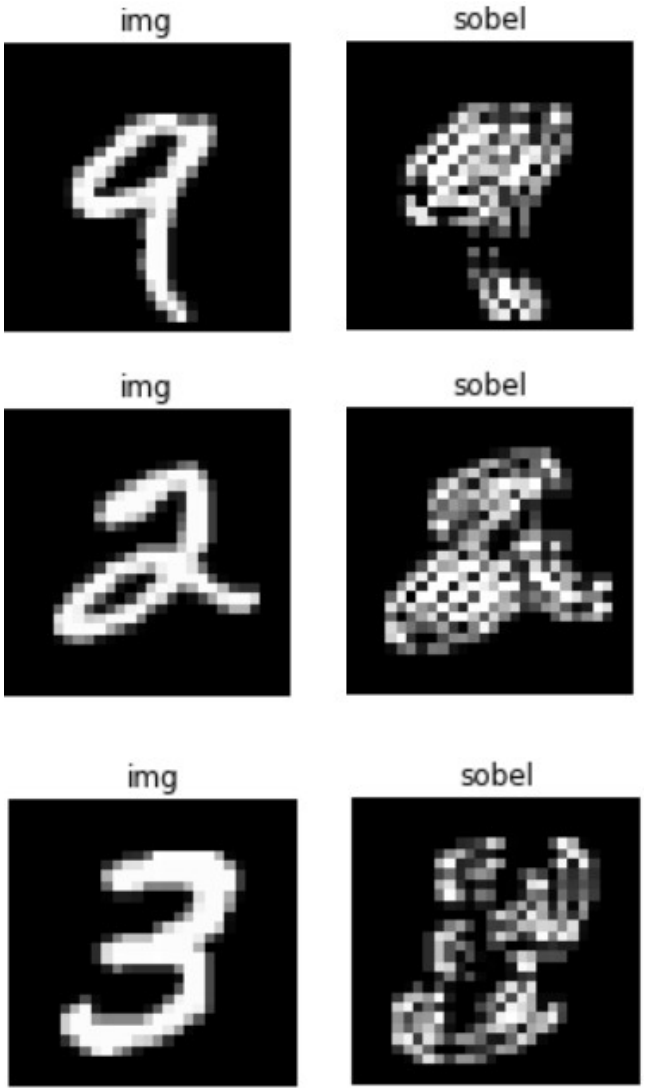


Image Descriptors – Shape / Edges

- Laplace

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

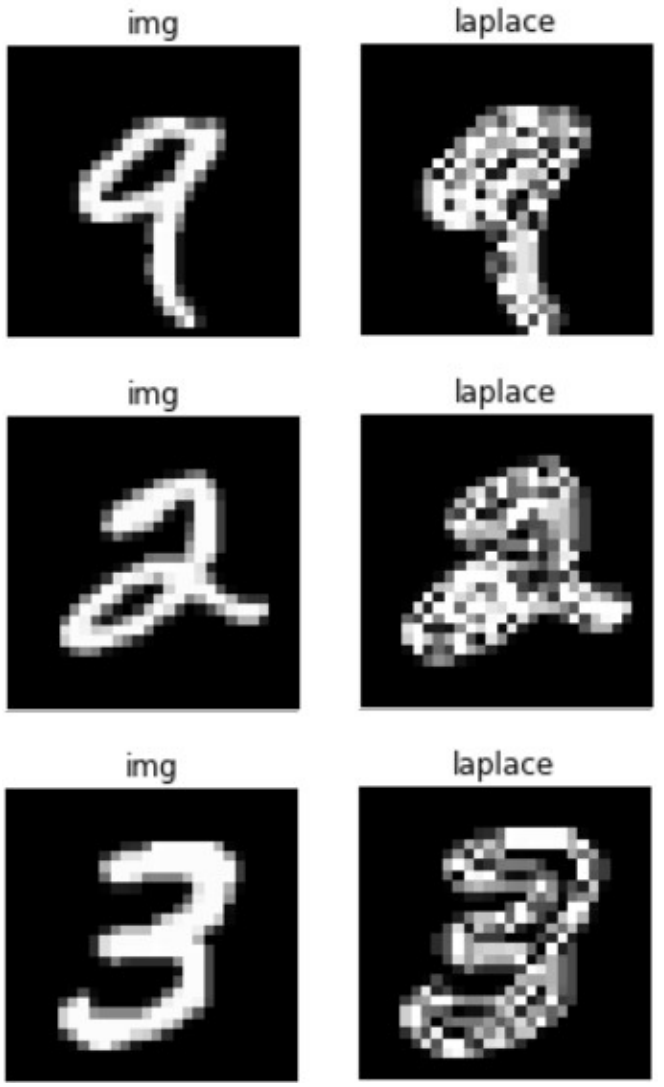


Image Descriptors – Shape / Edges

- Canny
  - Gaussian Gradient Based Filter (John F. Canny
    - Gaussian Blur
    - Gradient Detection

$$\mathbf{B} = \frac{1}{159}\begin{bmatrix} 2 & 4 & 5 & 4 & 2 \\ 4 & 9 & 12 & 9 & 4 \\ 5 & 12 & 15 & 12 & 5 \\ 4 & 9 & 12 & 9 & 4 \\ 2 & 4 & 5 & 4 & 2 \end{bmatrix} * \mathbf{A}.$$

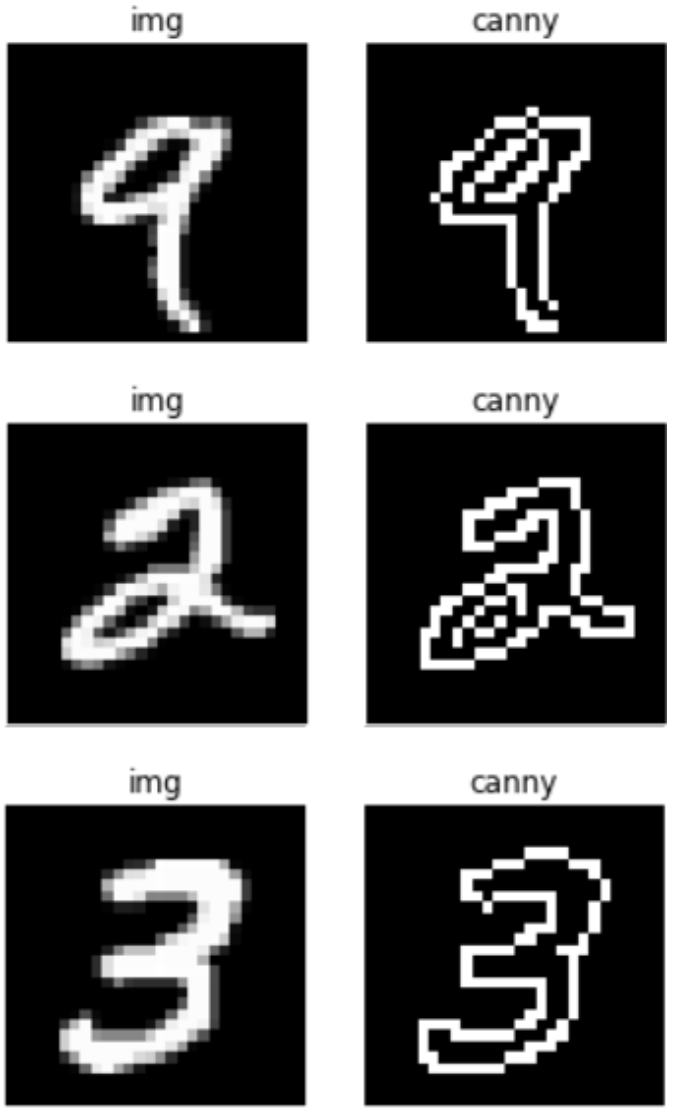


Image Descriptors – Shape / Edges

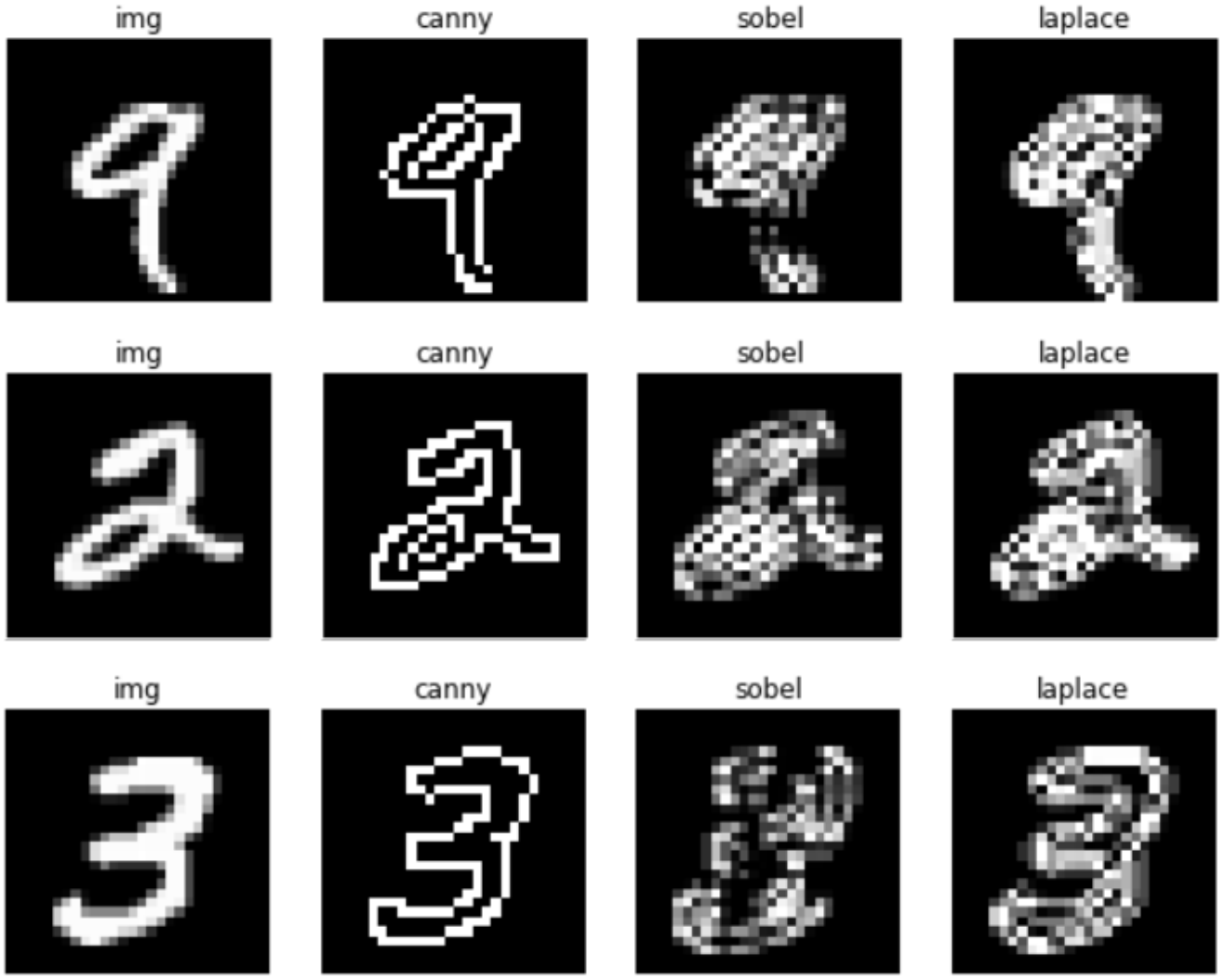
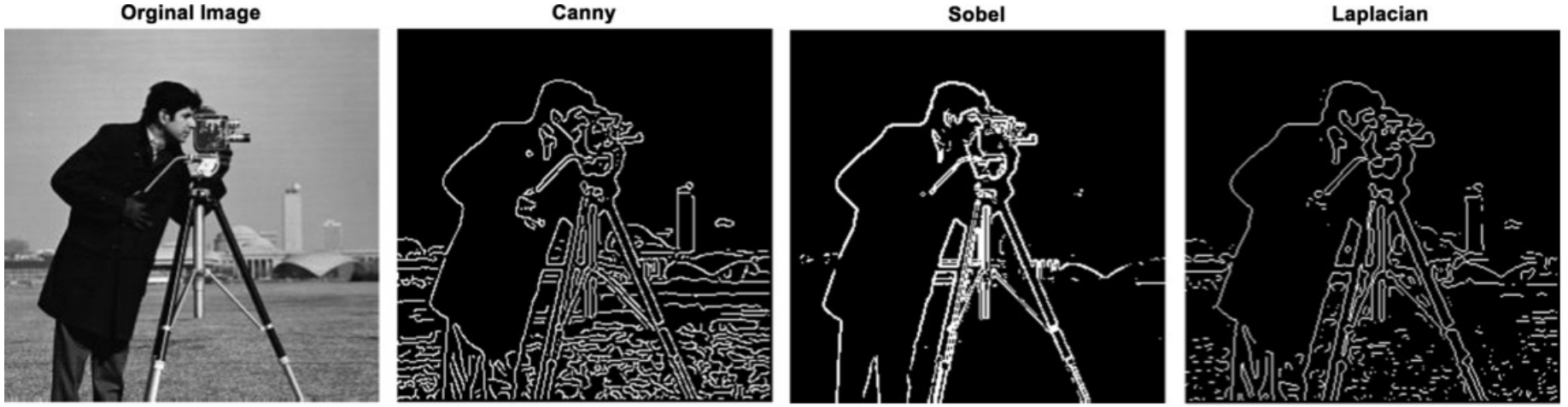
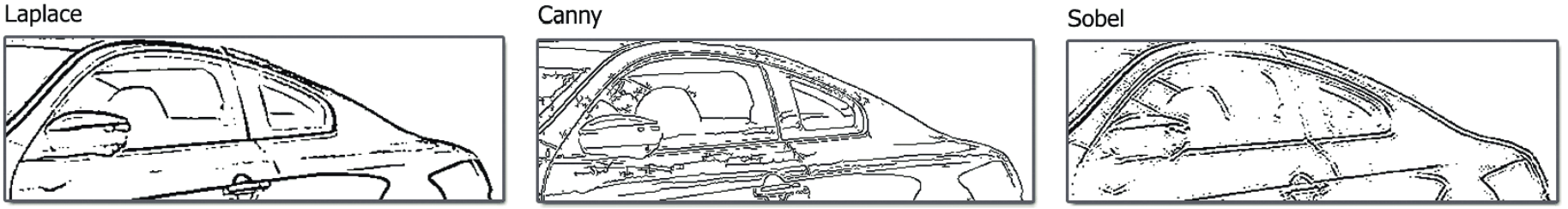


Image Descriptors – Shape / Edges





Let’s Code

- LINK