OpenCVDemo

Hands-on Demonstration Project

OpenCVDemo Project

- OpenCVDemo project demonstrates the basics of using OpenCV library to
  - Load a sample image from a file
  - Perform the following operations
    - Day 0 – Perform pixel by pixel image inversion
    - Day 1 - Spatial Filters
    - Day 2 - Intensity Processing
    - Day 3 – Segmentation and more …
  - Display both input and output frame using the GUI
  - Save the output results to different files

Image Inversion

- Computes image negative

Day 1 – Spatial Filtering

- Low Pass Filters
  - Gaussian Smoothing
  - Median Filtering
- High Pass Filters
  - Laplacian
  - Laplacian of Gaussian (LoG)
  - Sobel Filtering
  - Canny Edge Detection
- Custom filter

Gaussian Smoothing

- Reduces uniform noise

Median Filtering

- Reduces random noise

Laplacian

- Detects 2nd order derivative

Laplacian of Gaussian (LoG)

- Detects edges using 2nd order derivative

Sobel Filter

- Detects gradient (1st order derivative) along a direction

Canny Edge Detection

- Detects edges via edge-linking of weak and strong edges

Day 2 – Intensity Processing

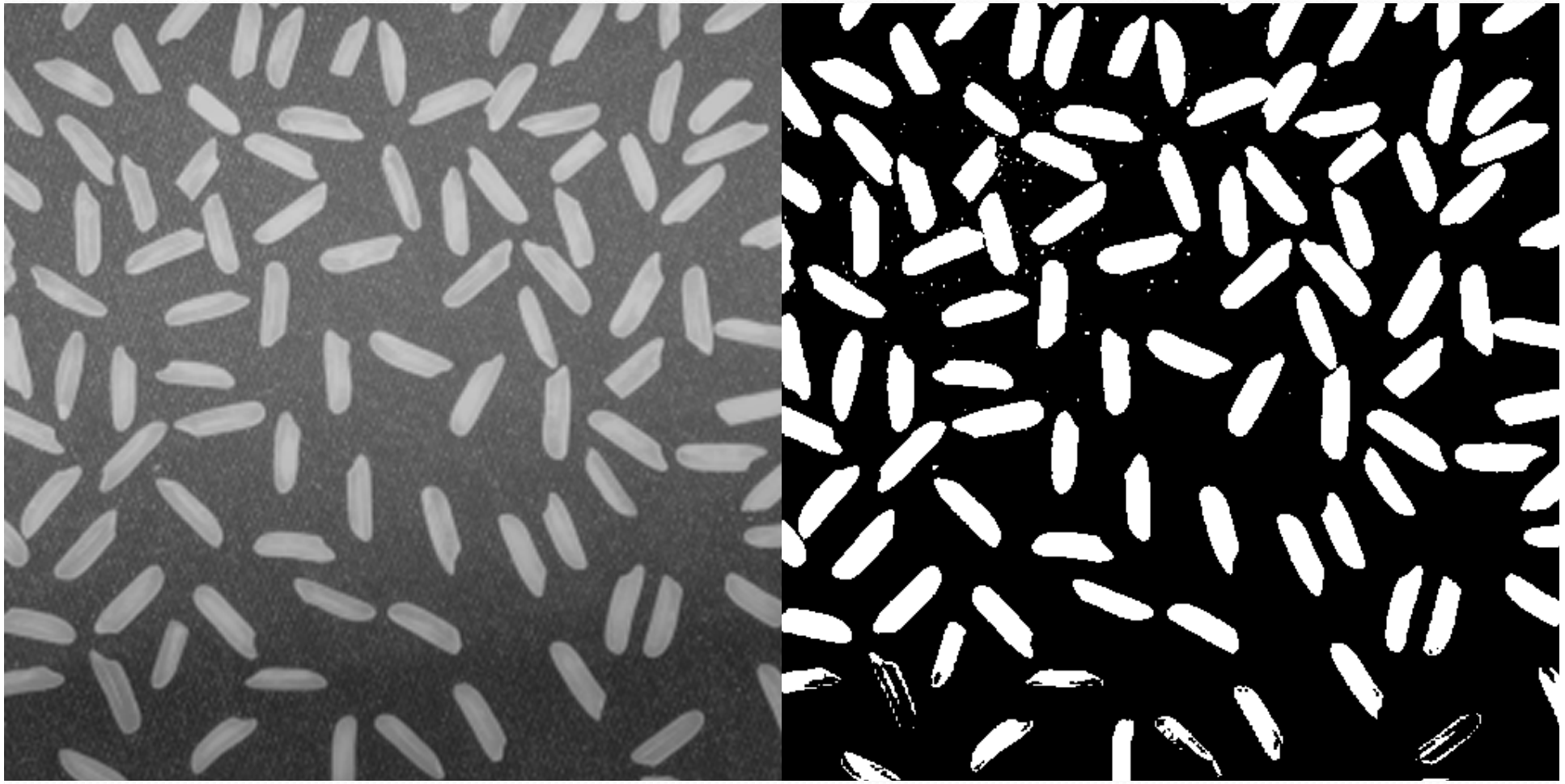
- Histogram Equalization
- Binary Thresholding
  - Fixed Threshold
  - Otsu Threshold
  - Local Adaptive Thresholding
- Morphological Operations
  - Erosion
  - Dilation
  - Opening
  - Closing

Histogram Equalization

- Enhances contrast

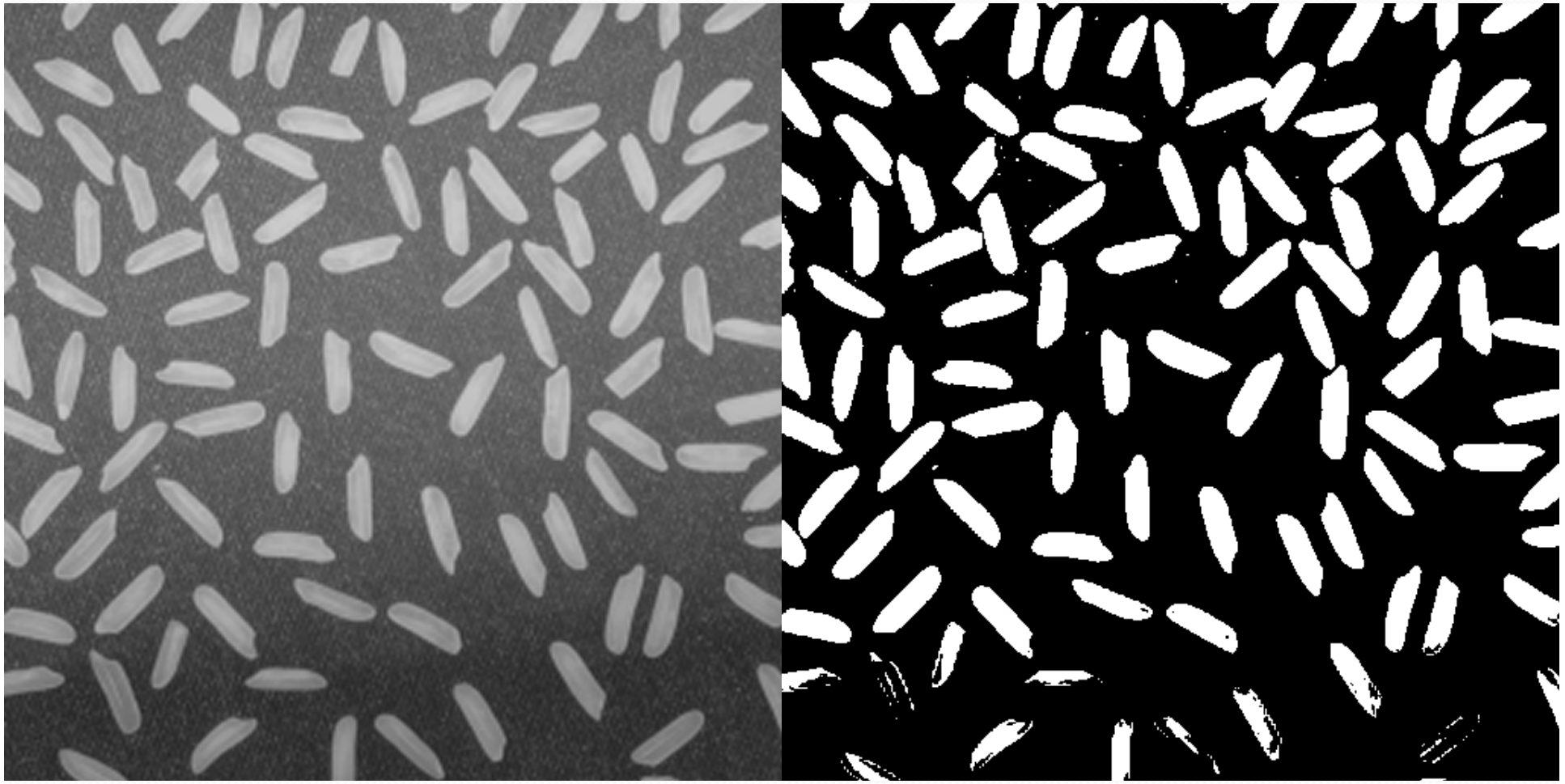
Binary Thresholding (Fixed)

- Segments image into two levels



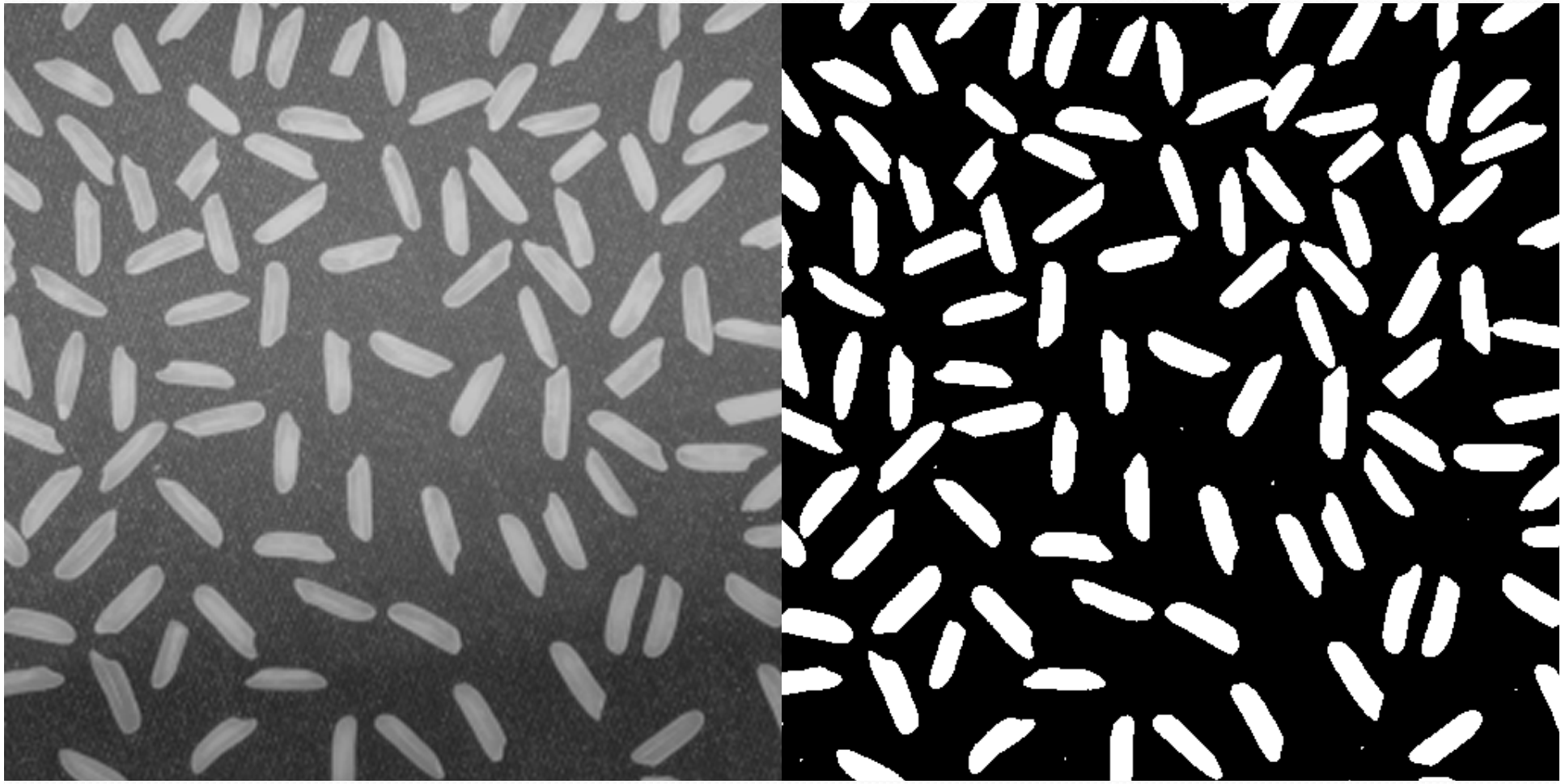
Binary Thresholding (Otsu)

- Segments image into two levels



Local Adaptive Thresholding

- Computes local threshold based on given window size

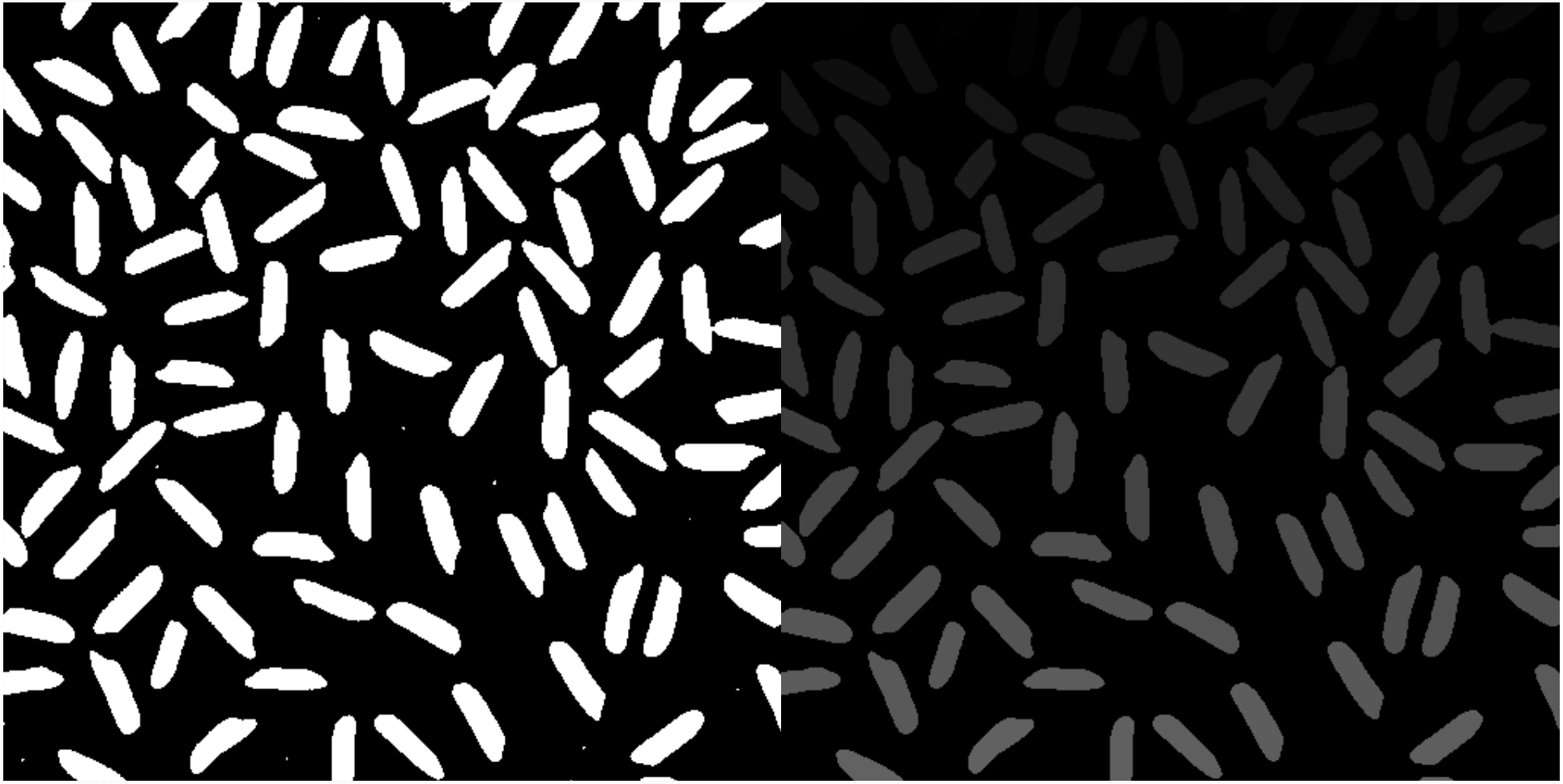


Day 3 – Segmentation

- Connected Components
- Contours
- Region Growing
- DFT
  - Frequency Filters

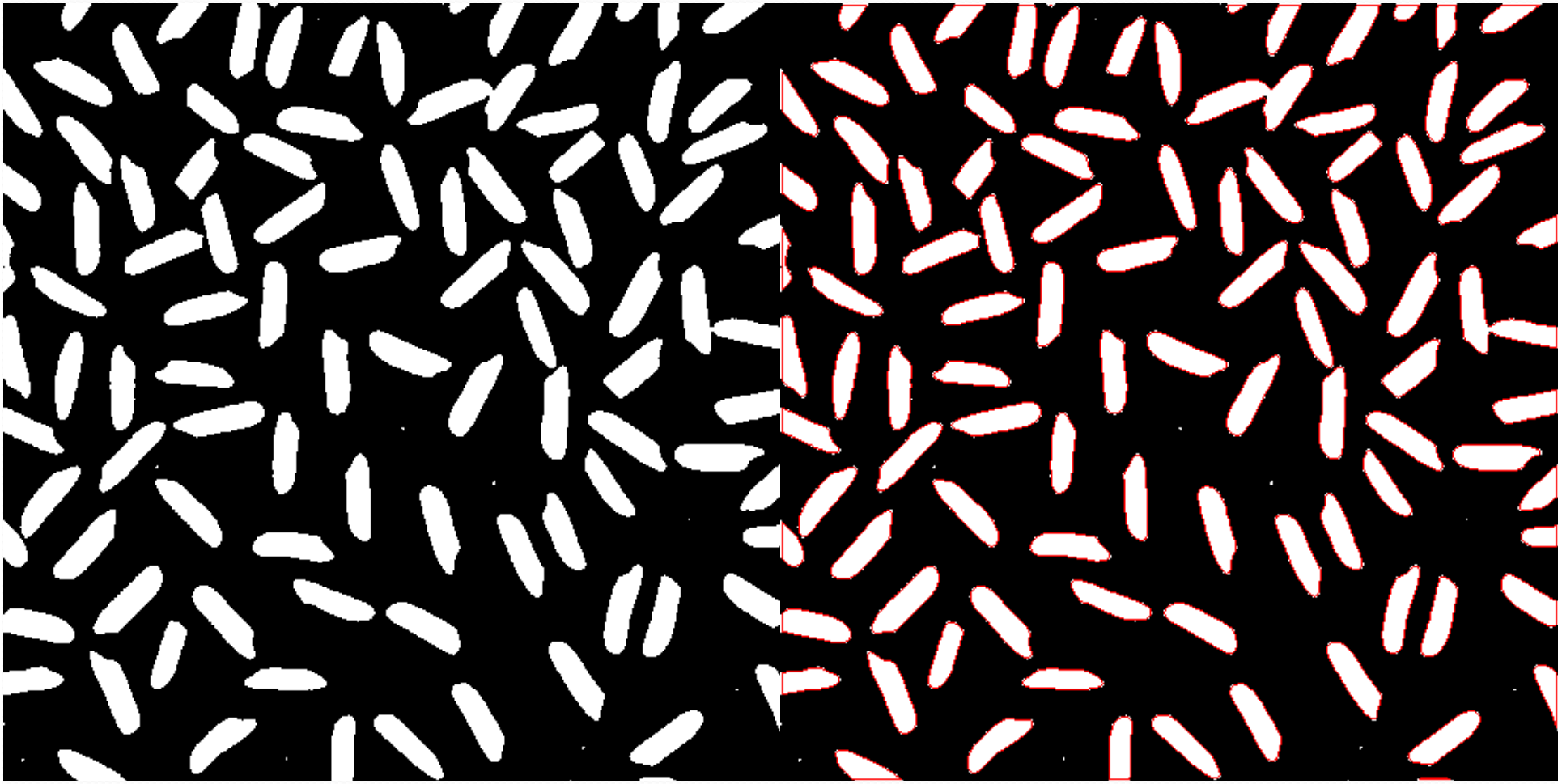
Connected Components

- Counts and marks number of distinct foreground objects



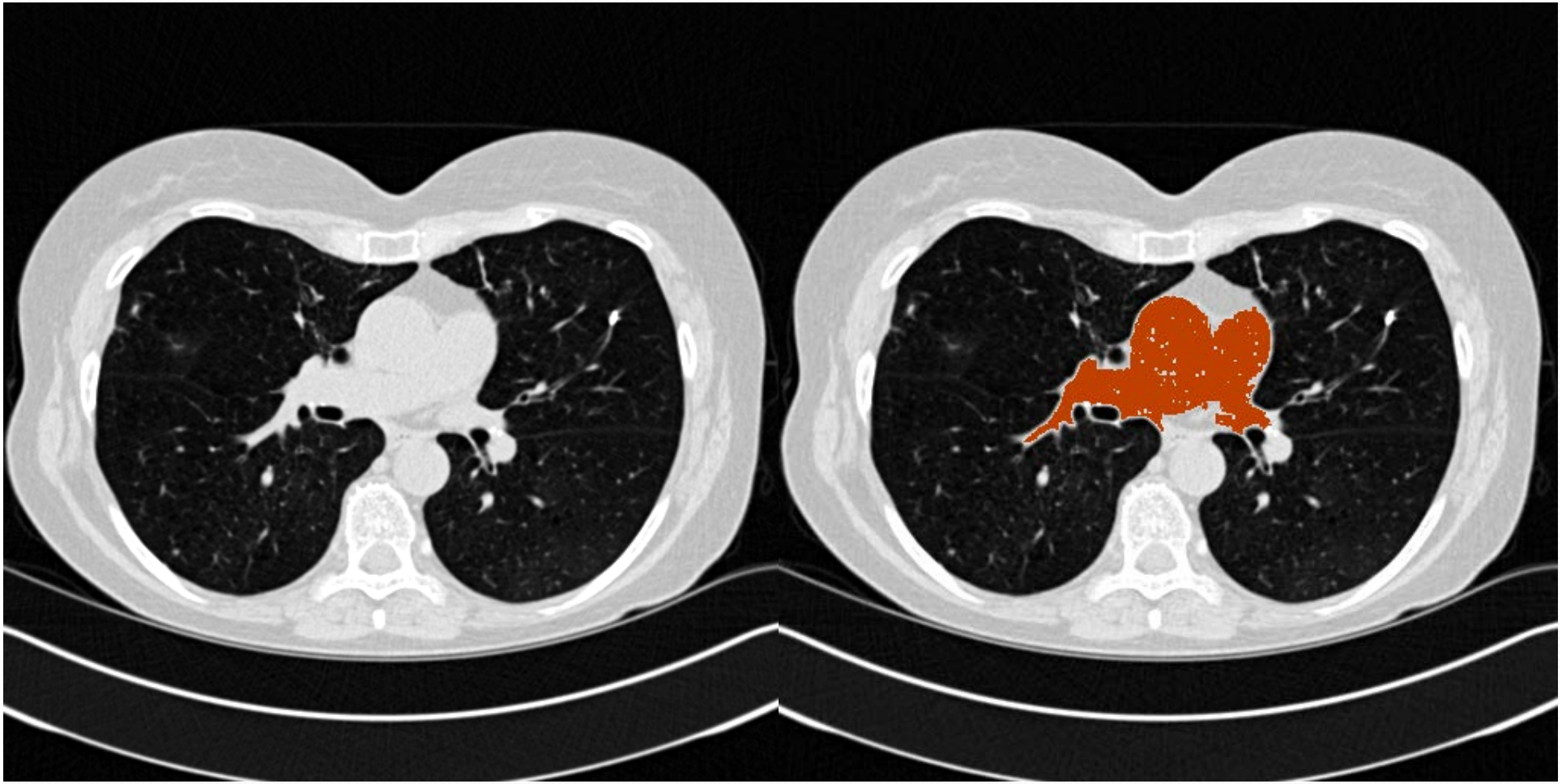
Contours

- Computes polygonal contour boundary of foreground objects



Region Growing

- Segments image starting from seed points iteratively



Thank you

And Happy Coding …