Image Preprocessing

Noise reduction
Gaussian, median, bilateral filtering

Contrast enhancement
Stretching, adaptive methods

Histogram equalization
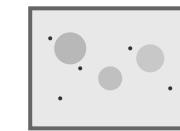Uniform intensity distribution

Morphological operations
Erosion, dilation, opening, closing

Registration basics
Aligning multiple images
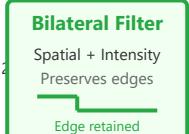
Preprocessing Pipeline

Original (Noisy)

Gaussian Filter

1	2	1
2	4	2
1	2	1

/16

Median Filter
Values:
3, 5, 7, 9, **12**, 15, 21, 22, 2
↓ Median
Output: 12

Bilateral Filter
Spatial + Intensity
Preserves edges
Edge retained

Histogram Eq.
Before   After

Morphological Operations

Erosion → Shrinks
Dilation → Expands
Opening → Separates
Closing → Connects

Complete Pipeline Example

Raw Image → Denoise (Median) → Enhance (Hist. Eq.) → Segment (Threshold) → Morph. (Clean) → Ready Image

Each step targets specific image quality issues