

Lecture 3, Part 2

Image Filtering (Non-Linear Filters)

Computer Vision
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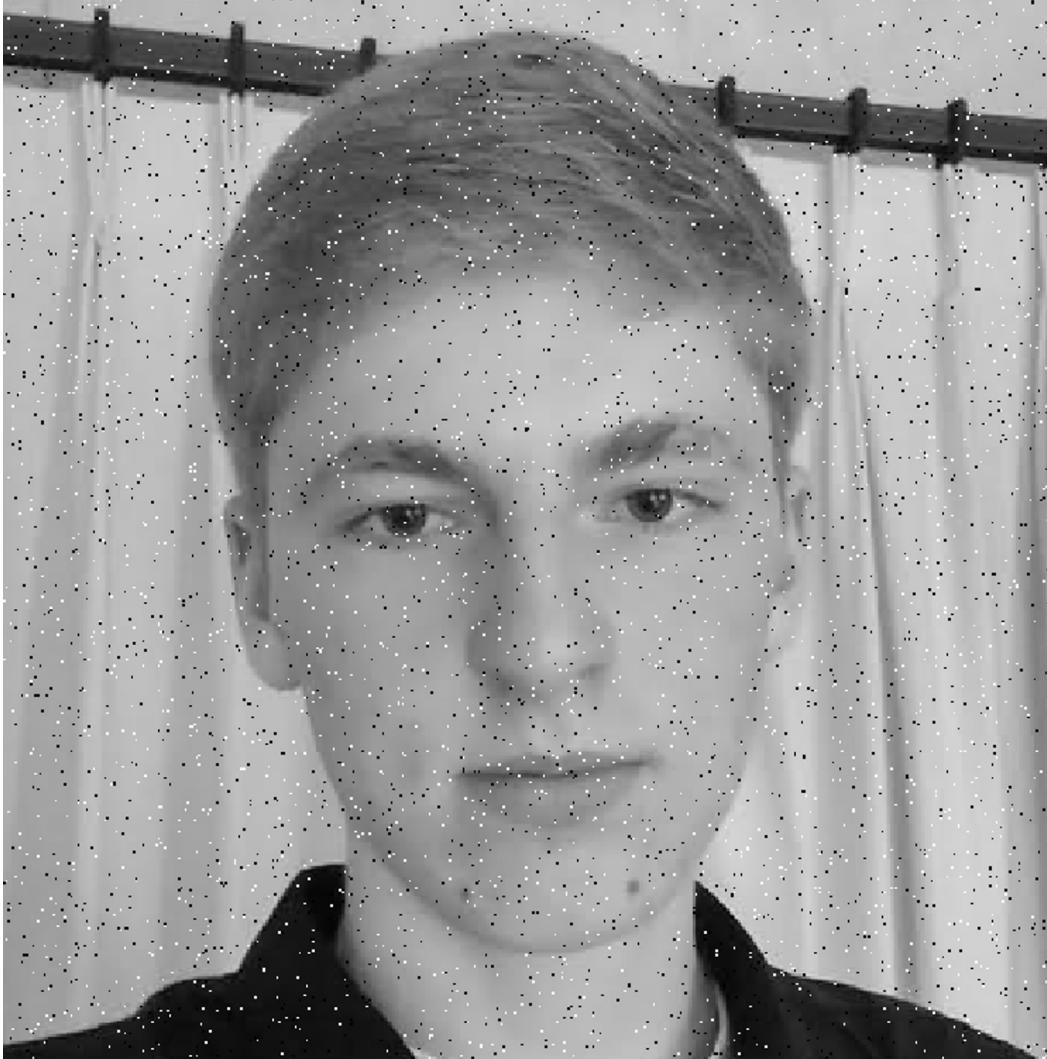
Image Filtering

- Non-Linear Filters – Median, Morphology
- Fun application: simulating tilt-shift images

Median filters

- Operates over a window by selecting the median intensity in the window.
- ‘Rank’ filter as based on ordering of gray levels
 - E.G., min, max, range filters
- Questions:
 - What advantage does a median filter have over a mean filter?
 - Is a median filter a kind of convolution?

Noisy Jack – Salt and Pepper



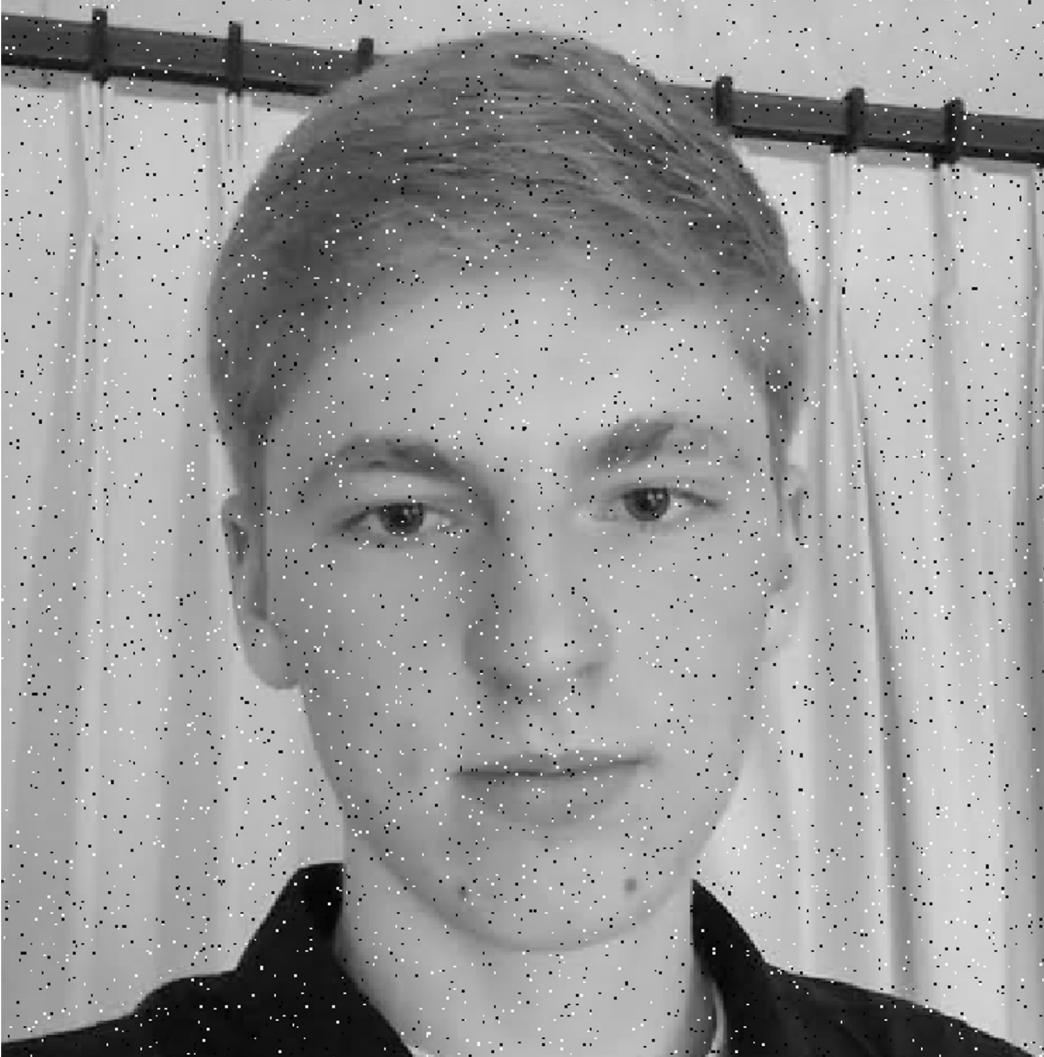
Mean Jack – 3×3 filter



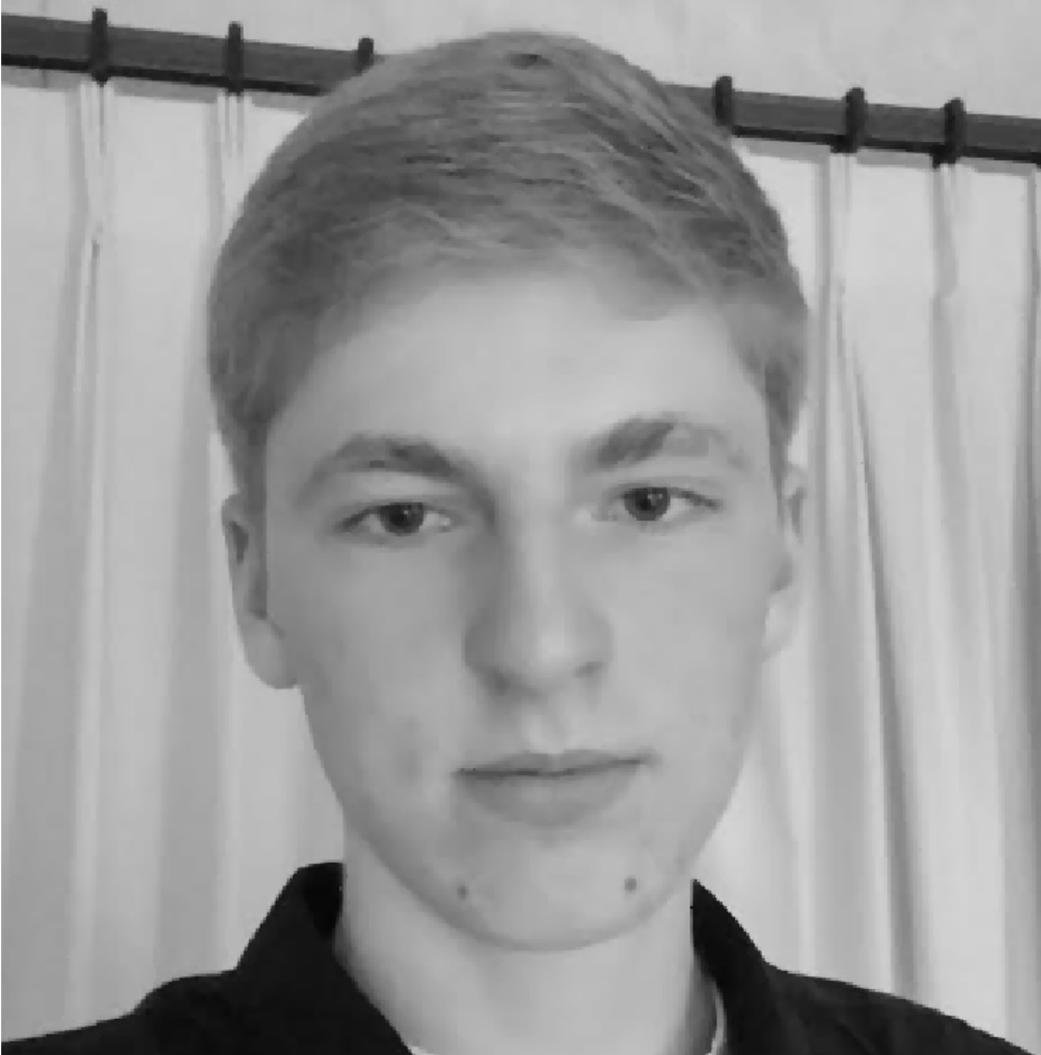
Very Mean Jack – 11 x 11 filter



Noisy Jack – Salt and Pepper



Median Jack – 3 x 3

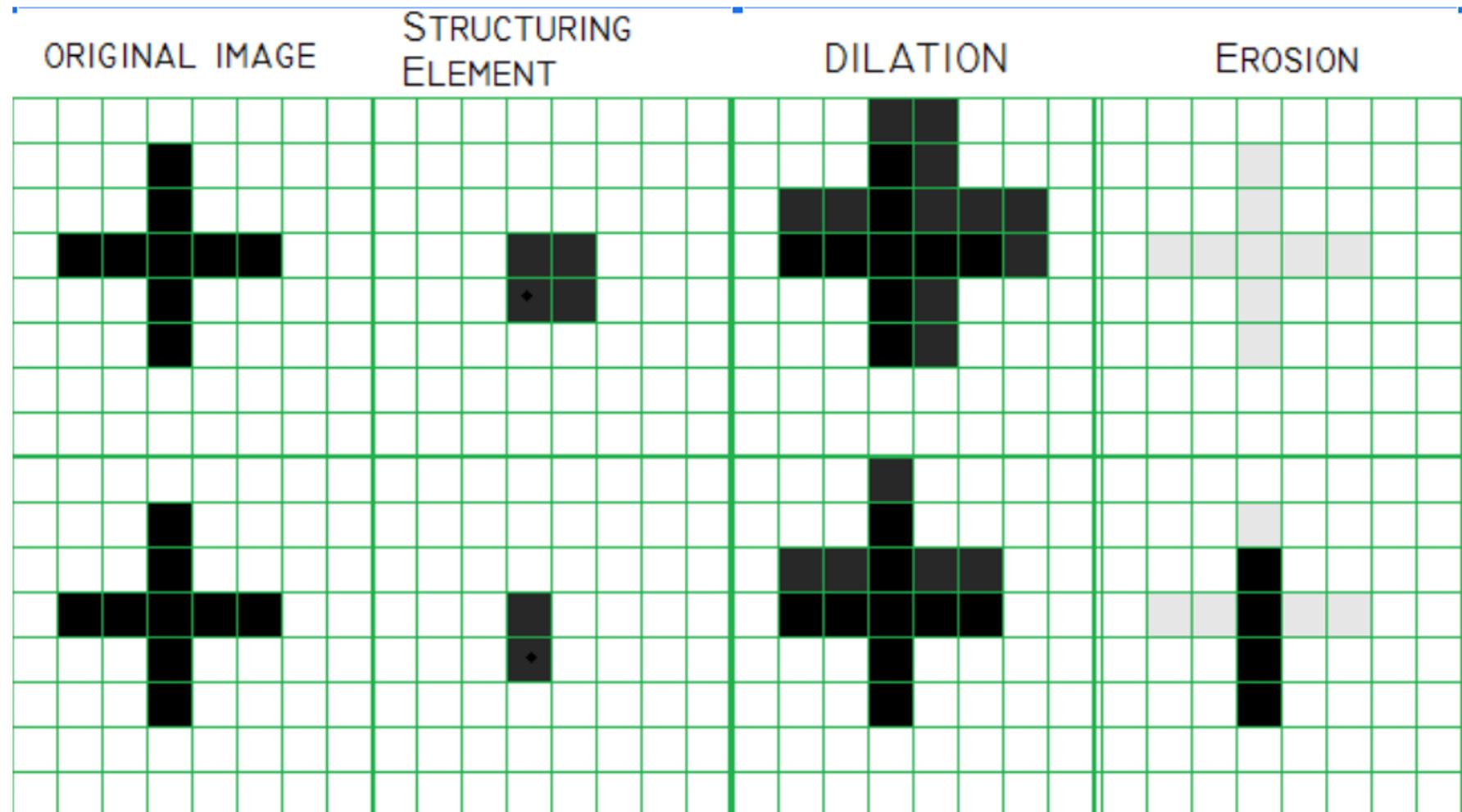


Very Median Jack – 11 x 11



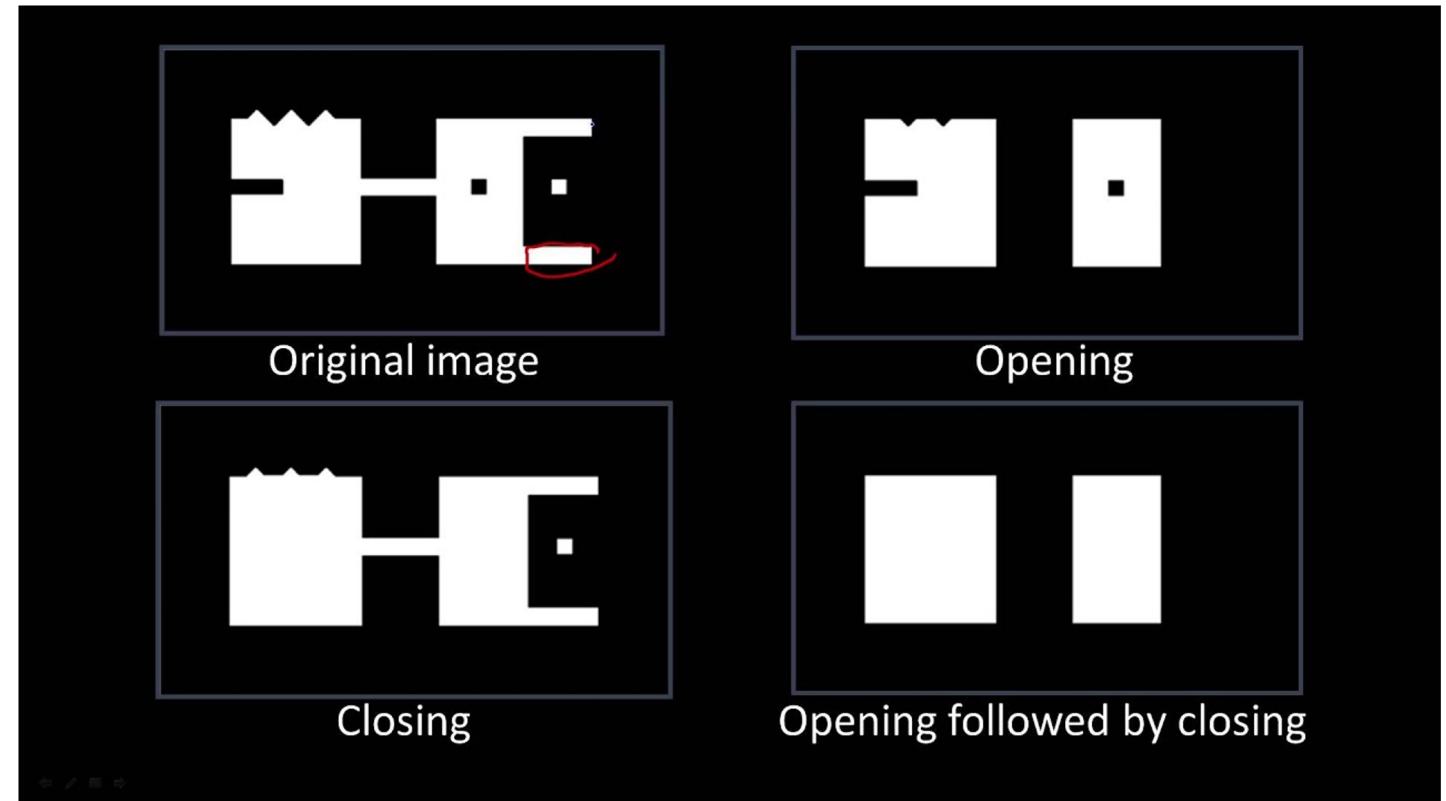
Non-Linear Filtering -- Morphological Operations

- Binary Images
 - Dilation
 - Erosion

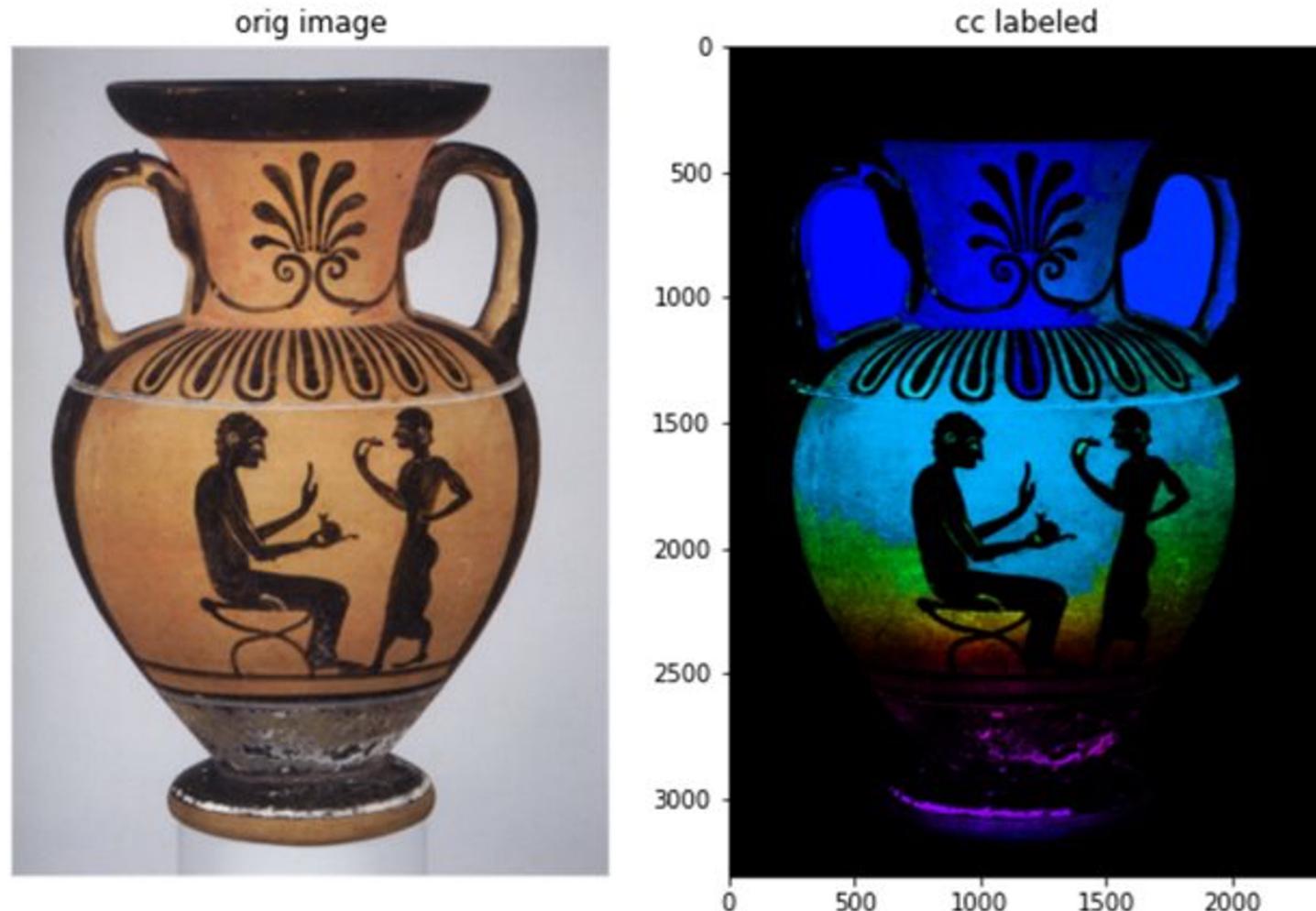


Non-Linear Filtering -- Morphological Operations

- Binary Images
 - Closing
(closes small holes)
 - Opening
(removes small portions)



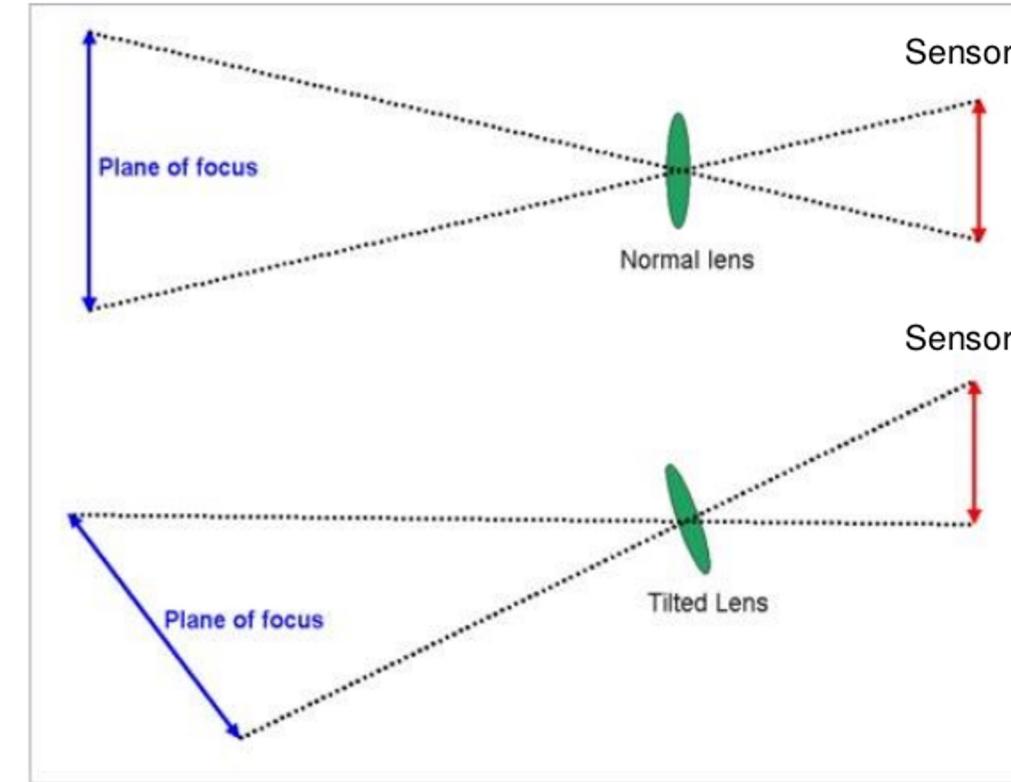
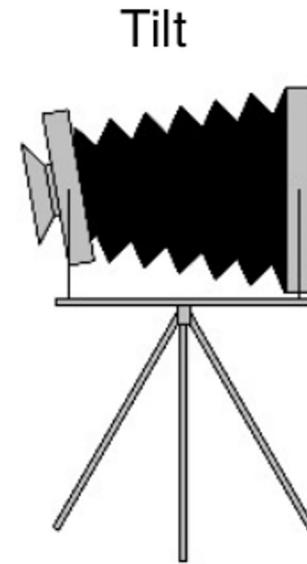
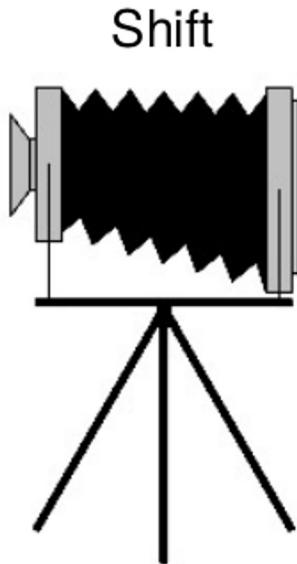
Non-Linear Filtering -- Connected Components



Tilt-shift photography

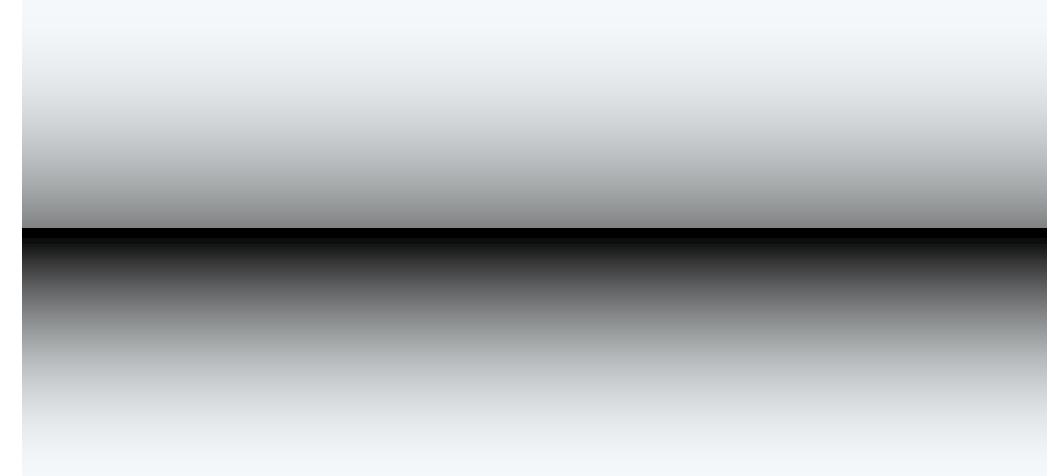
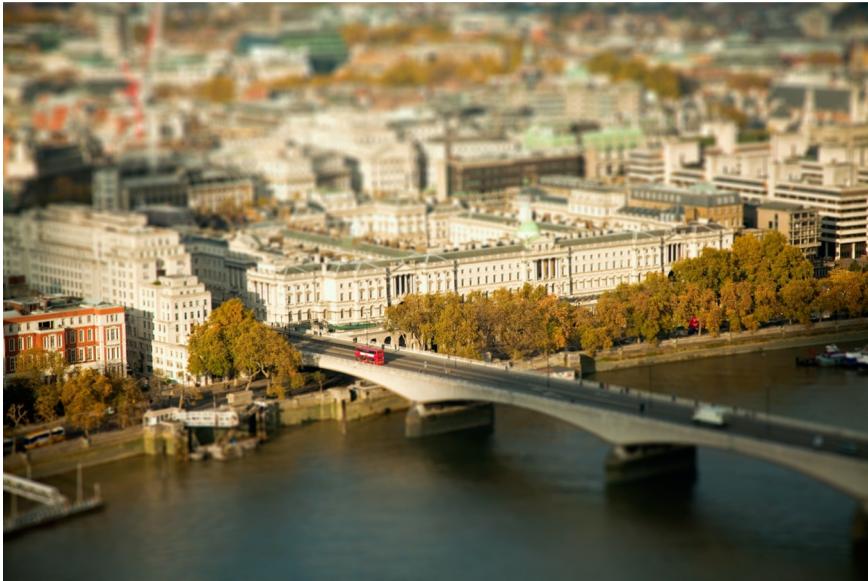


Tilt shift camera



Can we fake tilt shift?

- We need to blur the image
- We need to blur progressively more away from our ‘fake’ focal point



But can I make it look more like a toy?

- Transform to Hue, Saturation, Value
- Boost saturation – toys are very colorful
- Back to RGB, save.



