

# **SYDE 575: Introduction to Image Processing**

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# About SYDE 575

- Introductory course to the principles of image processing
- Topics Covered
  - Psychovisual model of the human vision system
  - Image enhancement in the spatial domain
  - Image enhancement in the frequency domain
  - Image restoration
  - Color image processing
  - Image and video compression
  - Image representation
  - Special topics in image processing (e.g., segmentation, registration, wavelets)

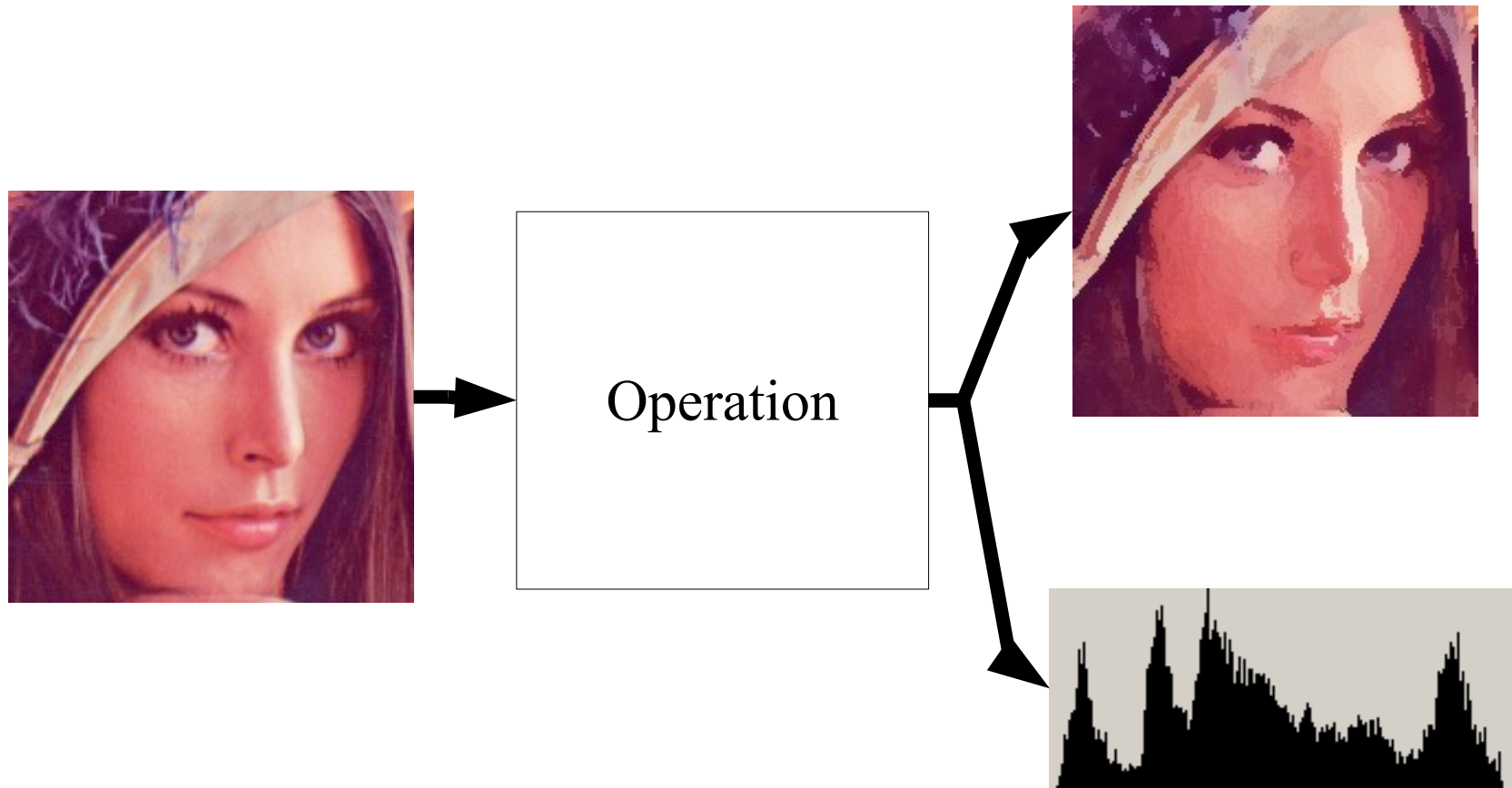
# Course Grading

- Homework problems
  - Assigned but not graded
- Labs (15%)
  - 3 computer labs, done in Matlab
- Midterm (20%)
- Term Project (15%)
  - Done individually
  - Evaluate or compare existing algorithms, or design new algorithm
  - Range of topics very broad
- Final (50%)

# Reading

- Required textbook
  - Gonzalez and Woods, Digital Image Processing, 3rd edition (2nd edition acceptable as well), Prentice Hall, 2008.
- Course slides available on the web  
<http://www.einfodaily.com/piTunez/syde575.htm>

# What's Image Processing?



# Image Processing Operations

- Enhancement and Restoration
  - Improve sharpness
  - Adjust image size
  - Remove scratches
  - Correct warping
- Storage
  - Efficiently store images and videos on multimedia devices
- Extract Information
  - Extract text from document
  - Measure tumor size from a radiograph

# Applications

- Enhance image detail



# Applications

- Noise reduction and sharpening





# Applications

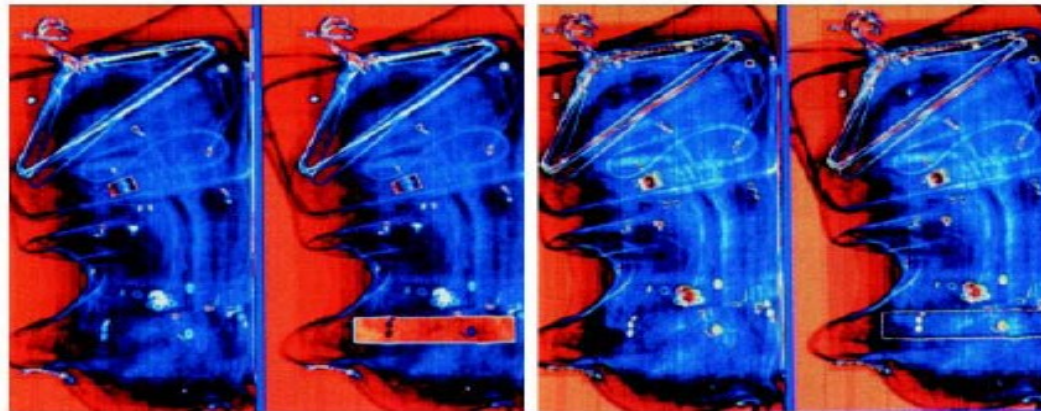
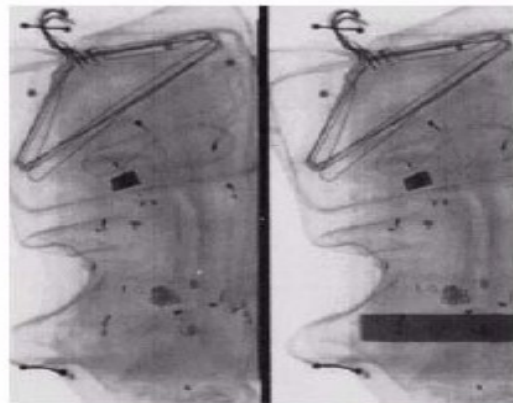
- Inpainting



Source: Criminisi et al. 2004

# Applications

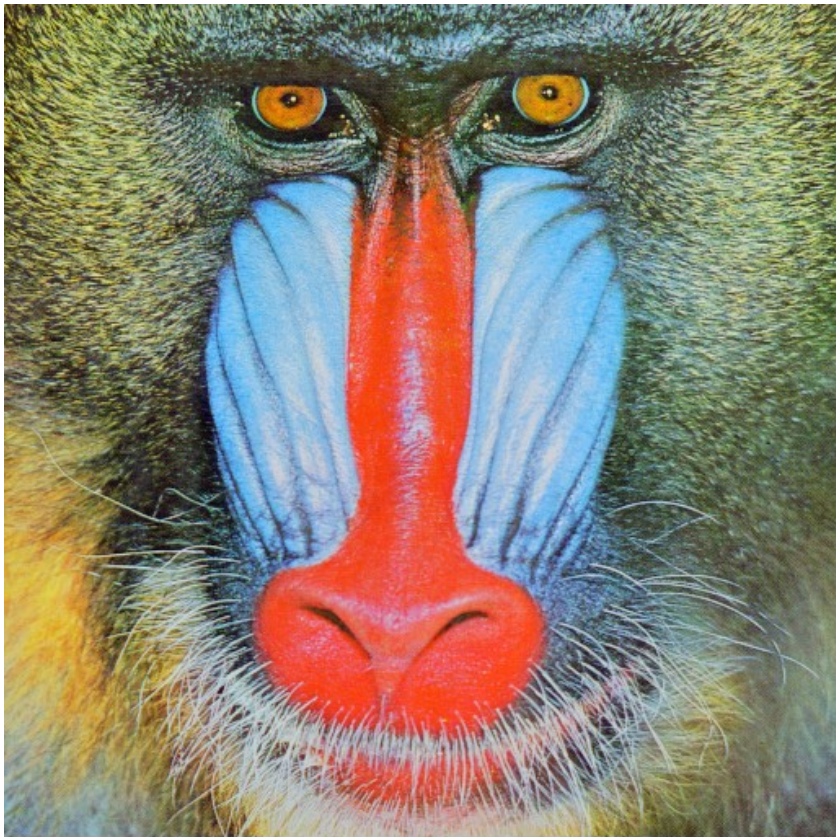
- Pseudocoloring for Security Screening



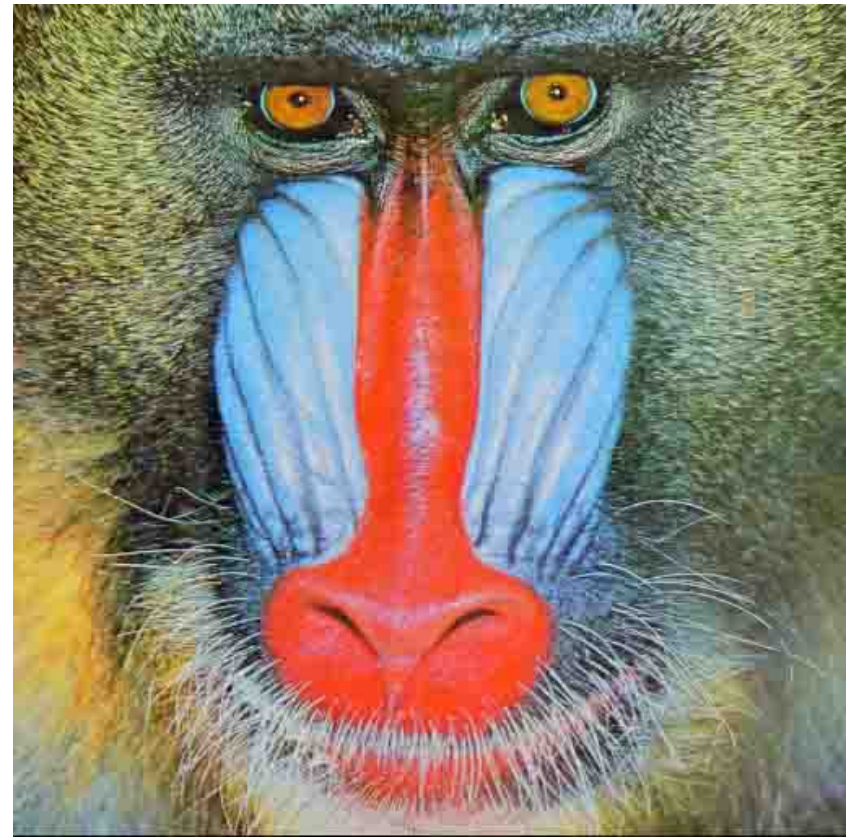
Source: Gonzalez and Woods

# Applications

- Image Compression



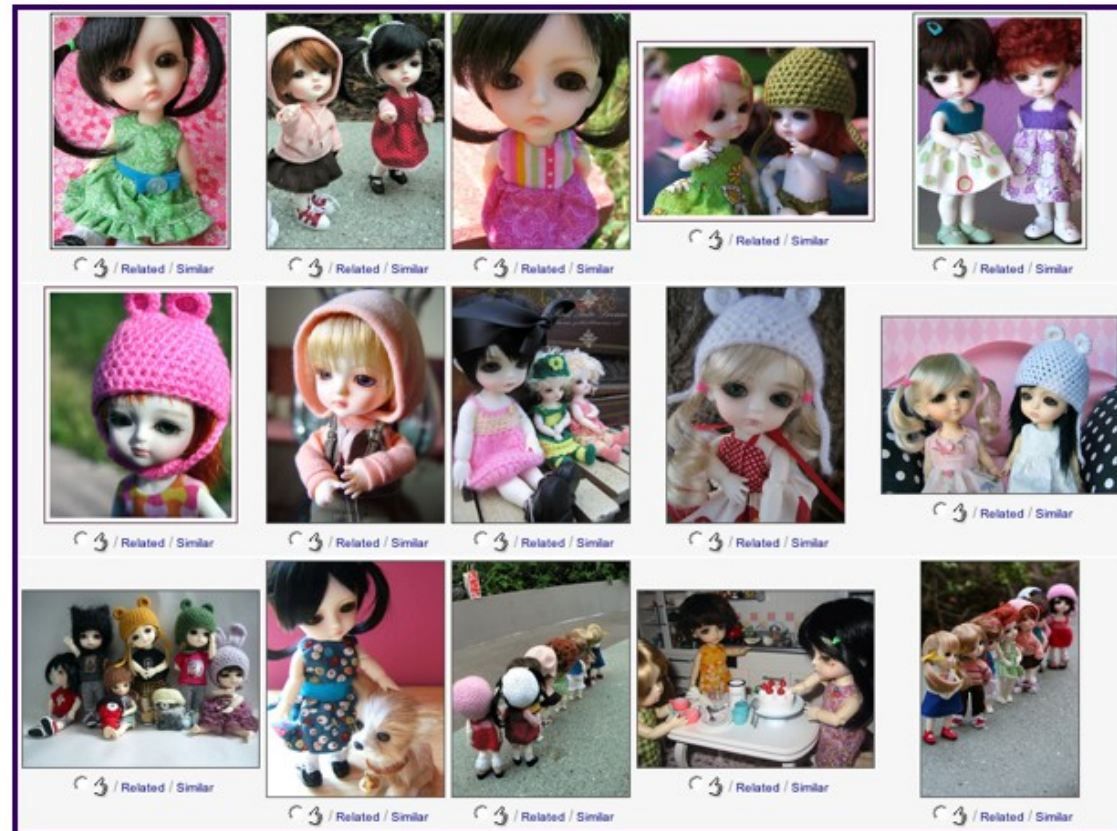
1:1



14:1

# Applications

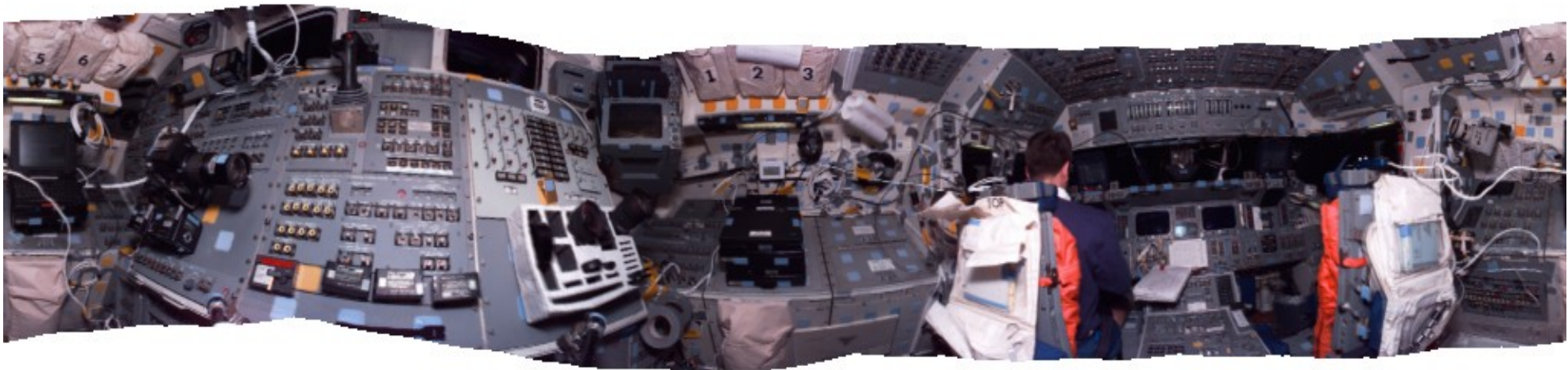
- Content-based Image Retrieval



Source: Li et al. 2008

# Applications

- Panorama Generation



Source: Szeliski et al. 1997

# Applications

- Spine Segmentation from Radiograph

