

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?

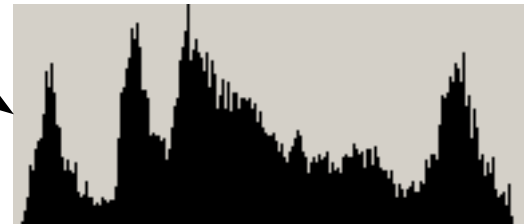
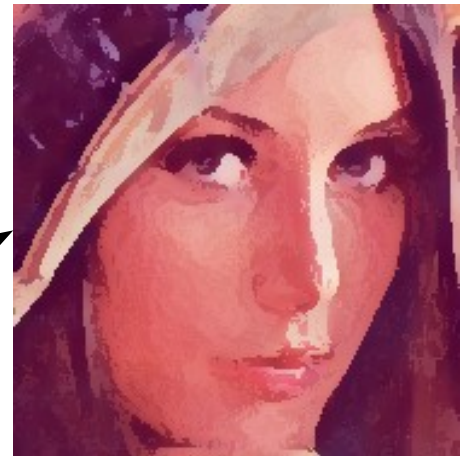
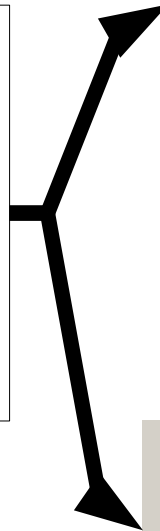
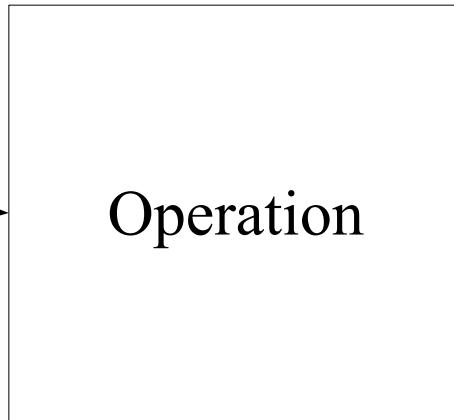


Image Processing Operations

- 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

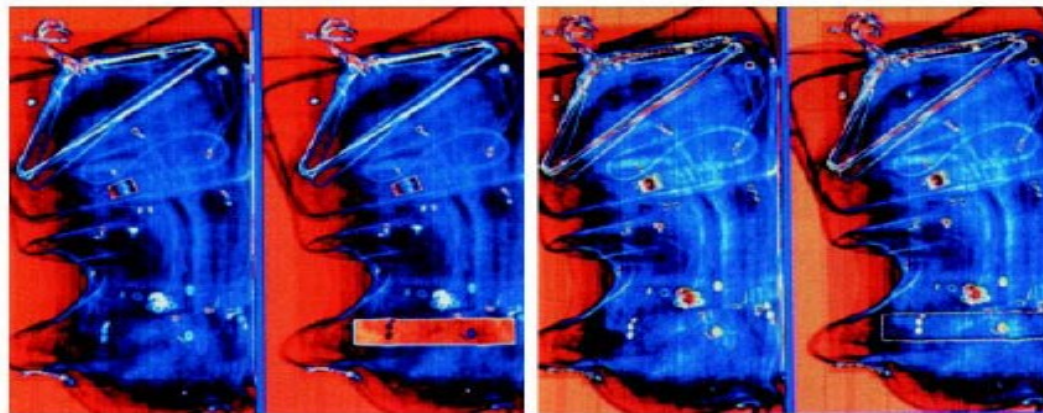
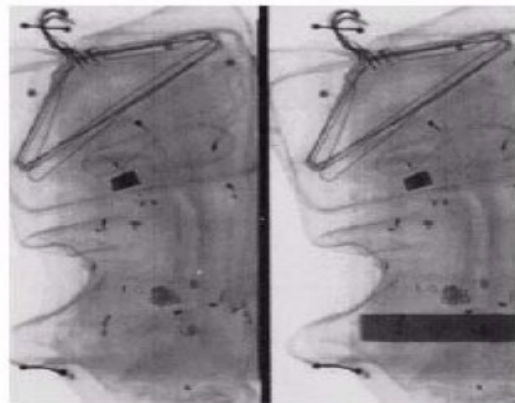
- Inpainting



Source: Criminisi et al. 2004

Applications

- Pseudocoloring for Security Screening



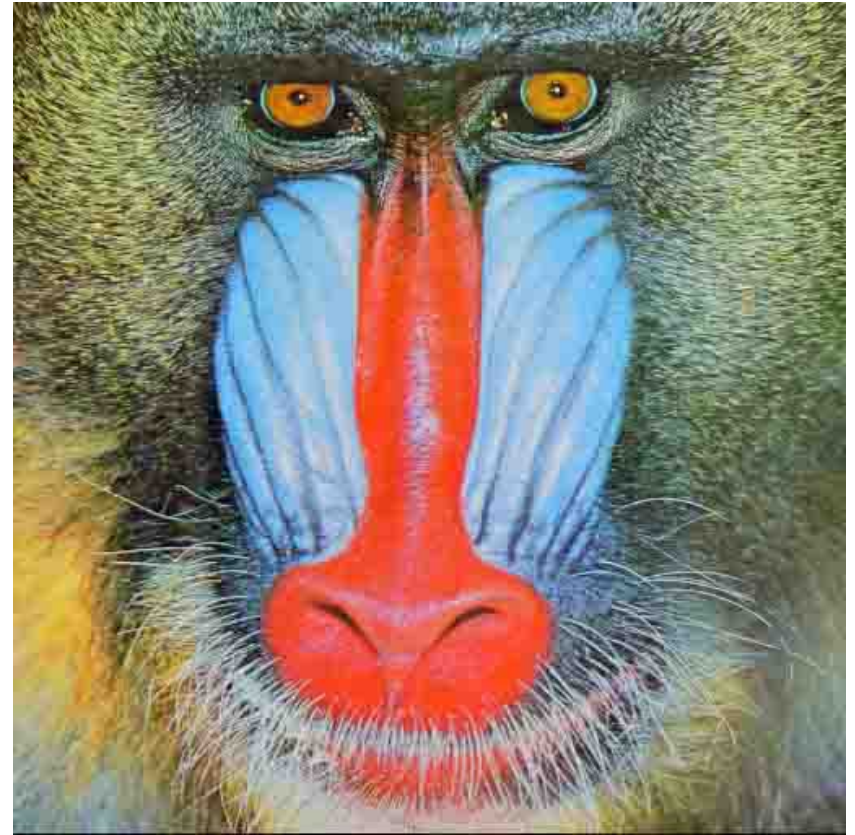
Source: Gonzalez and Woods

Applications

- Image Compression



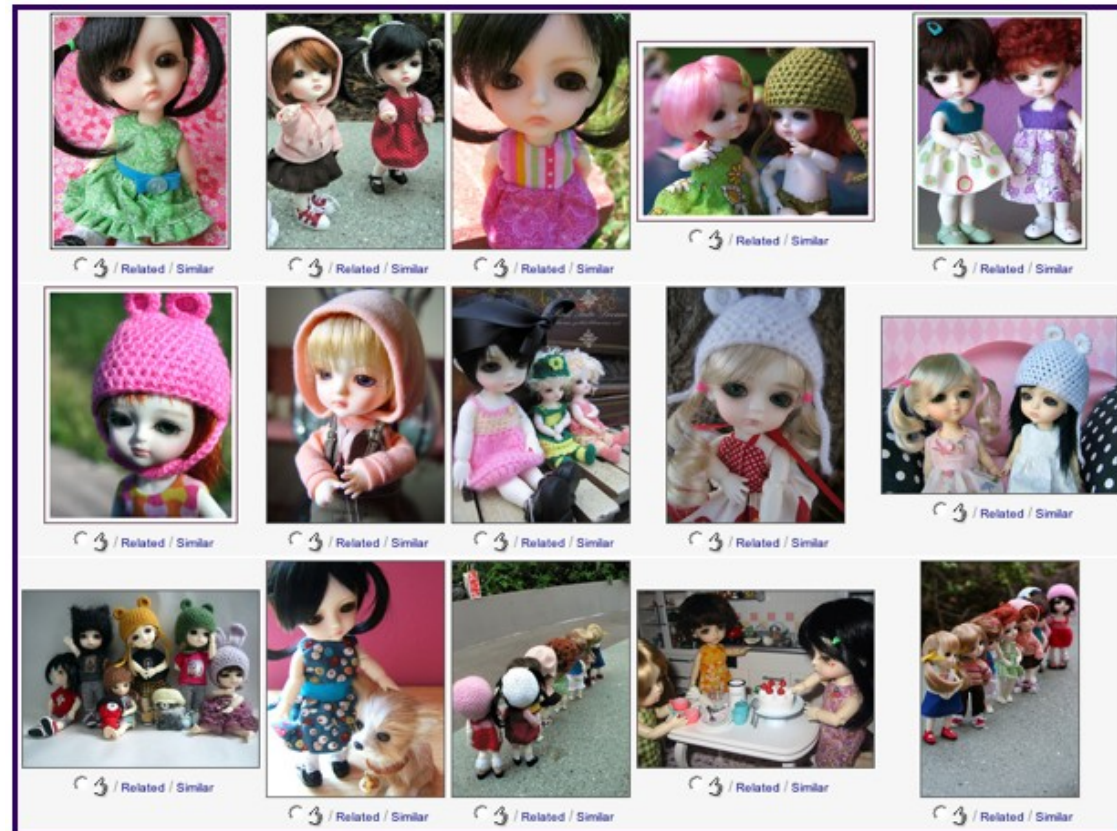
1:1



14:1

Applications

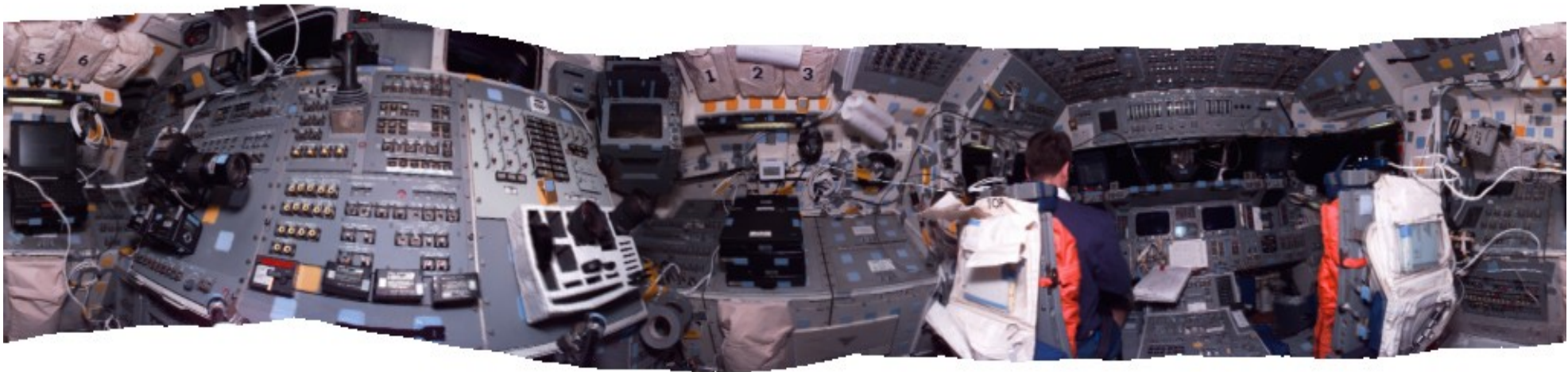
- Content-based Image Retrieval



Source: Li et al. 2008

Applications

- Panorama Generation



Source: Szeliski et al. 1997

Applications

- Spine Segmentation from Radiograph

