CS 3570
Final Project

5/31/2011

General Guideline

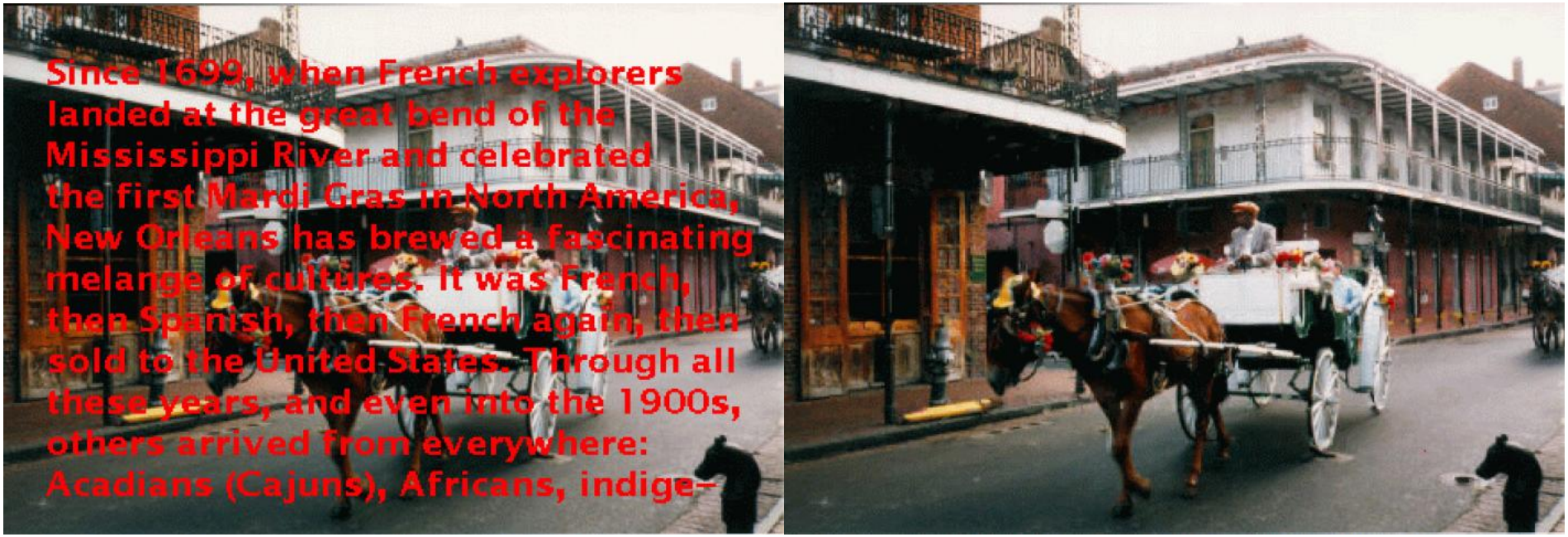
- 1-3 students form a group
- Select a topic for the final project.
- The project consists of three stages
  - Project proposal
  - Class presentation
  - Project demo/report

Suggested Topics

- Image inpainting
- Image retargeting
- Image editing
- Nonlinear image denoising
- Convolution reverb
- Speaker recognition
- Image/audio retrieval
- Background subtraction/subtraction
- Video stabilization
- Surveillance video compression
- Others related to multimedia technology

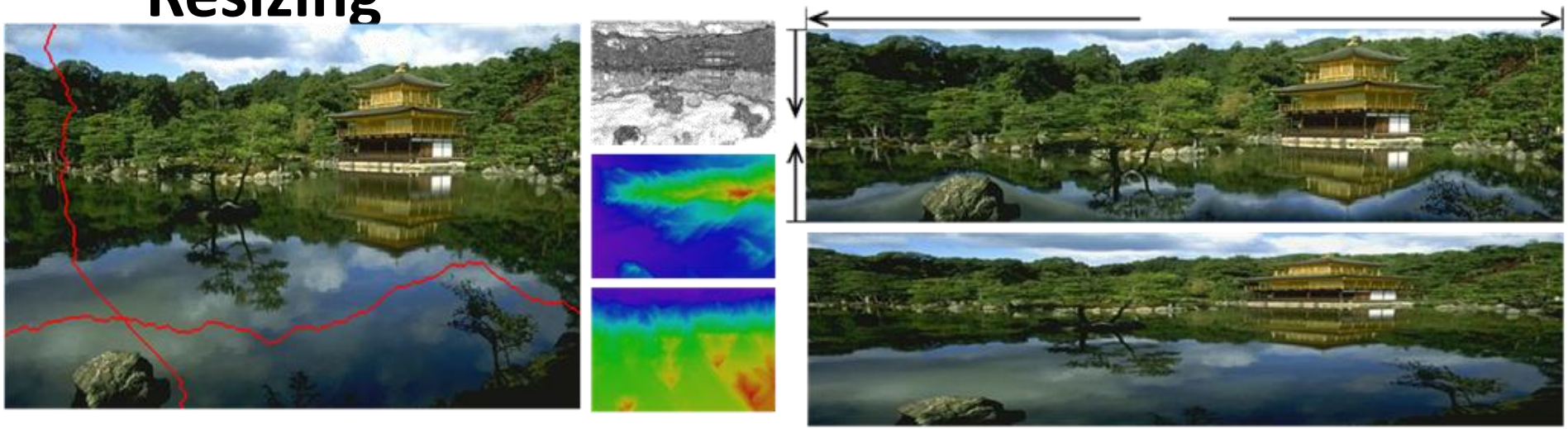
1.Image inpainting

- ***Inpainting*** is the process of reconstructing lost or deteriorated parts of images
- Ref: **http://ppt.cc/6hpy Image Inpainting**



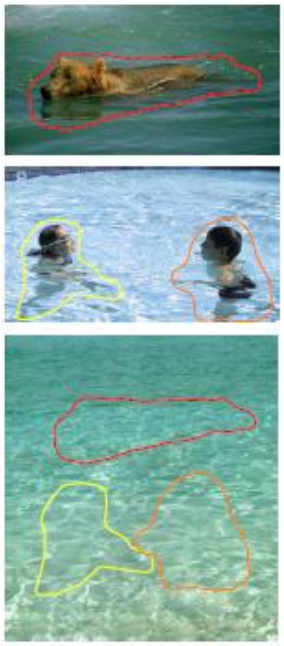
2. Image retargeting

- Resizing images that was aware of the actual photo's contents
- Ref: **http://ppt.cc/SOsM**
  Seam Carving for Content-Aware Image Resizing



3. Image editing

- *Image editing* encompasses the processes of altering images
- Ref: **http://ppt.cc/Mjf!** Poisson Image Editing



sources/destinations

cloning

seamless cloning

4. Non-linear Image Denoising

- The goal of image denoising methods is to recover the original image from a noisy image for advanced image analysis
- A. Buades, B. Coll and J.M. Morel, “A non-local algorithm for image denoising”,IEEE Int. Conf. on Computer Vision and Pattern Recognition, 2005.
- C. Tomasi and R. Manduchi, “Bilateral filter for gray and color images”, IEEE International Conference on Computer Vision,1998

5. Convolution Reverb

- In audio signal processing, **convolution reverb** is a process for digitally simulating the reverberation of a physical or virtual space. It is based on the mathematical convolution operation, and uses a pre-recorded audio sample of the impulse response of the space being modelled.
- http://lac.zkm.de/2006/papers/lac2006_fons_adriaensen_01.pdf
- http://freeverb3.sourceforge.net/

6. Speaker Recognition

- Given a speech audio, we can recognize who makes this speech by the MFCC features extracted from the speech signal..
- This technique involves machine learning. We first determine the features of the signals, and use the training data to train a model for classification.
- Ref: Speaker Verification Using Adapted Gaussian Mixture Models, D. A. Reynolds, Digital Signal Processing 10, 19–41 (2000). http://www.ll.mit.edu/mission/communications/ist/publications/000101_Reynolds.pdf

7. Image/Audio Retrieval

- An **image/audio retrieval** system is a computer system for browsing, searching and retrieving images/audios of similar contents from a large database.
- Compute representative features for images/audio signals.
- User relevance feedback.
- Image Retrieval
  - http://savvash.blogspot.com/2009/10/image-retrieval-systems.html
  - Content-Based *Image Retrieval Systems*: A Survey
- Audio Retrieval
  - *Audio Retrieval* by Rhythmic Similarity
  - Music and Audio Retrieval Tools (MaART) http://maart.sourceforge.net/

8. Background Subtraction / Synthesis

- Moving object detection in video sequences is one of the main tasks in many computer vision applications.
- Background subtraction is an common approach for this task. The idea is to compare the current image against background model which learned by GMM
- C. Staufer, W.E.L. Grimson, “Adaptive background mixture models for real-time tracking,”*CVPR*, Vol. 2, pp. 246-252, June 1999.

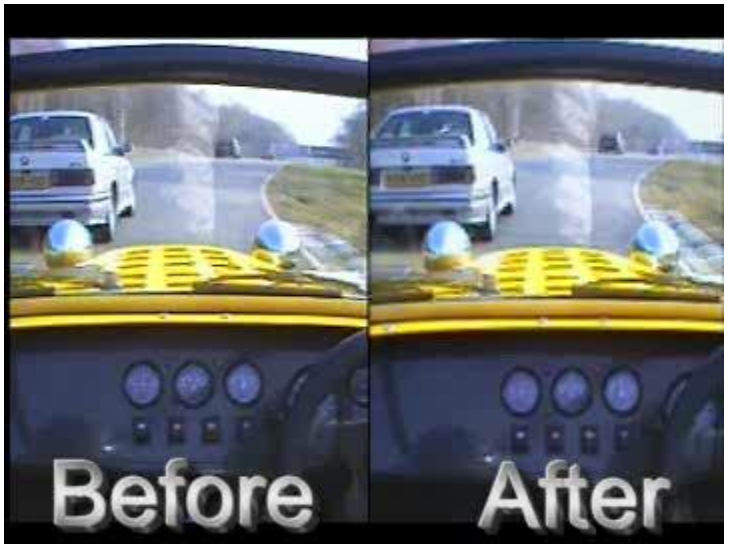
Background subtraction

synthesis

9. Video Stabilization

- Videos retrieved from video devices is affected by unwanted camera shakes and jitters, resulting in video quality loss.
- Video stabilization techniques are important to obtain high quality and stable video footages even in non-optimal conditions

Y. Matsushita, E. Ofek, X. Tang and H. Shum “Full-frame video stabilization”, IEEE Int. Conf. on Computer Vision and Pattern Recognition, 2005



10. Surveillance Video Compression

- Video surveillance has been widely used in recent years to enhance public safety and privacy protection
- Surveillance video usually has constant background
- State-of-the-art video compression methods such as H.264/AVC often lead to high computational complexity
- The algorithm taught in class can be used to compress surveillance video and compare with other compression algorithms.

Schedule

- 6/7: Project proposal due in class (project title, project goal, team members, references)
- 6/14,17: Project presentation in class
  - 4/6/8 minutes for teams of 1/2/3 students
- 6/17,27 (afternoon): Project presentation/demo and final project report due (Location to be announced)