Today

• Project 6 questions
• Wednesday class will be a discussion period
• What makes a good photo?
What Makes a Great Picture?

© Robert Doisneau, 1955

With many slides from Alyosha Efros, Yan Ke, as annotated by Tamara Berg
Photography 101

- Composition
  - Framing
  - Rule of Thirds
  - Leading Lines
  - Textures and Patterns

- Lighting
  - Color coordination / balance
Framing

“Photography is all about framing. We see a subject -- and we put a frame around it. Essentially, that is photography when all is said and done.”

-- from photo.blorge.com
Frame serves several purposes:

1. It gives the image depth
2. Use correctly, framing can draw the eye of the viewer of an interest to a particular part of the scene.
3. Framing can bring a sense of organization or containment to an image.
4. Framing can add context to a shot.

http://digital-photography-school.com/blog/frame-your-images/
Examples of nice framing

http://flickr.com/photos/paulosacramento/226545698/
http://flickr.com/photos/chrisbeach/13868545/
http://flickr.com/photos/74531485@N00/929270814/
http://flickr.com/photos/freakdog/223117229/
http://flickr.com/photos/cdm/253805482/
Rules of Thirds

http://www.photo96.com/blog/?p=371
Other examples

- A serene landscape with a bench overlooking mountains.
- A picturesque sea with a building perched on stilts.
- A rural scene with a cart and people in the countryside.
- A bustling street with people and greenery.
Leading Lines
More examples
Textures and Patterns
Complementary colors (of opposite hue on color wheel)
Anyone can take great pictures...
Alyosha claims to be a bad photographer...
…but a pretty good photo critic!

http://flickr.com/photos/aaefros/

# of my Paris photos on Flickr: 32
Total # of Alyosha’s Paris photos: ~1250 ~2%
The Postmodern Photographer

The Old Days: a pre-process

• Load film
• Find subject
• Position camera
• Set all the settings “just right”
• Take a deep breath…
• ...Press buttom!

The New Digital Days: a post-process

• Get a 16 GB memory cartridge
• Take pictures like there is no tomorrow!!!
• …
• Back home, spend hours of agony trying to find 1-2 good ones
Not considering semantic measures of what makes a photo good (subject matter, humor, etc). Professional = those you would frame, snapshot = those that would stay in photo album.
What makes one photo better than another?

- Simplicity
- Realism
- Basic photographic techniques
Prof - Obvious what one should be looking at ie easy to separate subject from the background. Snap – unstructured, busy, filled with clutter.
Simplicity

“alien flower” by Josef F. Stuefer @ Flickr
Simplicity

“Waiting in line!” by Imapix @ Flickr
Basic techniques

- **Blur** - Snaps – entire photo blurry indicates poor technique. Prof - background out of focus by widening the lens aperture, but foreground in sharp focus.

- **Contrast and brightness** - Make the subject pop out by choosing complementary colors for subject & background. Isolate the subject by increasing lighting contrast between subject & background.

Abstract concepts - “Good composition, color & lighting”
(Sur) Realism

Snaps look real, while prof photos look surreal.

“Golden Gate Bridge at Sunset” by Buzz Andersen @ Flickr

“Golden Gate 3” by Justin Burns @ Flickr
(Sur) Realism

“Somewhere Only We Know Prt2 (sic)” by Aki Jinn @ Flickr
Outline

- Photography 101
- Recognition
  - What makes one photo better than another?
  - What features can we extract?
  - How can we measure our performance?
Features – Spatial Distribution of Edges

More edges near border due to background clutter

More edges near center of img

“Picture of a picture…” by Ted Johnson @ Flickr

Trying to capture a photo’s “simplicity”
Spatial Distribution of Edges

Mean Laplacian of snapshots

More uniformly distributed

$M_s$

Low quality photos

Mean Laplacian of professional

More concentrated

$M_p$

High quality photos

Expect high quality photos to have high spatial frequency edges nearer to center than snapshots.
Edge width

Calculate area that edges occupy – width of bounding box covering 96% of edge energy

Cluttered regions should tend to produce a larger bounding box, and well defined subjects should produce a smaller one.
Color Distribution

- K-NN on color histogram

\[ q_{cd} = \# \text{professional_neighbors} \]

For query image find k nearest neighbors in training set. Quality = number of prof neighbors in top 5.
# unique hues smaller for prof photos even though they tend to look more vibrant and colorful (S,V may vary more) – another measure related to “simplicity”

\[ q_h = 20 - (\# \text{ hues} > \text{threshold}) \]
Prof photos should have some part of photo in sharp focus.

- Look at frequency distribution.
- Measure the amount of blur in the sharpest object, instead of the average blur.
Low Level Features - Contrast

Prof photos usually have higher contrast

Contrast = width of middle 98% mass of hist
Contrast

Contrast (98% mass)
Low Level Features – Avg. Brightness

Professional photographers may adjust exposure to be correct on subject only so subj pops from bkd. Cameras tend to adjust brightness to average at 50% gray, but prof photos might deviate significantly. Use ave brightness as feature.
Classifier

- Naives Bayes
- We assume independence of the features
- We achieve better results with added features even though they are not independent.
Outline

- Photography 101
- Recognition
  - What makes one photo better than another?
  - What features can we extract?
  - How can we measure our performance?
Use photos average rating as ground truth quality measure

Use only top 10%, bottom 10% as dataset.

Use half for training/half for testing.

---

**Statistics**

- **Place:** 1 out of 829
- **Avg (all users):** 7.987
- **Avg (commenters):** 8.805
- **Avg (camera):** 7.998
- **Avg (no camera):** 6.333
- **Views since voting:** 6597
- **Views during voting:** 1003
- **Votes:** 478
- **Comments:** 190
- **Favorites:** 133 (view)

---

**Voting Breakdown**

- 1: 0
- 2: 1
- 3: 2
- 4: 5
- 5: 24
- 6: 54
- 7: 89
- 8: 109
- 9: 89
- 10: 105

---

Photo contest website, user rated

- **60K photos**
- **40K photographers**
- **10/90 percentile**
Results

\[
\text{recall} = \frac{\# \text{ professional photos above threshold}}{\text{total } \# \text{ professional photos}}
\]

\[
\text{precision} = \frac{\# \text{ professional photos above threshold}}{\# \text{ photos above threshold}}
\]
Most Distinctive Feature: Blur

- A badness metric, rather than a goodness metric.
Results

72% classification rate
Web Retrieval Results
Summary

• Yan Ke’s method and several closely related publications tend to answer the question “Is this photo well composed?” and not “Is this photo interesting?”.
• They focus on hand-formulated, mid-level cues and not high level considerations
• More recent works move towards higher-level reasoning.
Why is this photo awesome?
Why did this photo win a Pulitzer prize?

Omaha Beach, Normandy, France. Robert Capa, 1944
2009 Pulitzer Prize for Feature Photography.
Smiley N. Pool, Dallas Morning News.
2006 Pulitzer Prize for Breaking News Photography.
Test – Are these good or bad?
Flickr’s Most Interesting

pot hill
From *Cinnamon

Rock and Ether
From vorlich

Where you’ll find me, where you’ll find:
From Taylor-Tomorrow

Untitled
From ultraviolett

summer ‘s leaving
From HansH

Olden fjord, Norway
From Kenny Muir
Quality vs. Interest

• Quality and Interestingness are correlated, but they are different concepts.
• High Level Describable Attributes for Predicting Aesthetics and Interestingness
Sagnik Dhar, Vicente Ordonez, Tamara L. Berg,
IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2011
Data -> Low level features:
- Center surround color histogram
- Color spatial distribution map
- Multi-scale contrast map
- Center surround wavelet energy
- ROYGBIV Color pair histogram
- Haar features
- Spatial Pyramid of shape features
- Sky color histogram

Ke et al. Low level features:
- Color
- Contrast
- Brightness
- Hue
- Blur
- Distribution of edges (Simplicity)

High level attribute classification:
- Compositional attributes
  - Salient objects
  - Rule of thirds
  - Low depth of field
  - Opposing colors
- Content attributes
  - Faces
  - Portraits
  - Presence of Animals
  - Indoor/Outdoor
  - 15 Scene types
- Sky illumination attributes
  - Clear sky
  - Cloudy sky
  - Sunset sky

Interestingness Classifier

Results
- Positive
- Negative
• Green – proposed method
• Black – Ke et al. features with Naïve Bayes