Today

- Computer vision overview
- Course overview
- Image filtering
- Image sampling
- Edge detection?

What do computers see?

What do humans see?
What do humans see?

Torralba et al. PAMI 2008

What do humans see?

Torralba et al. PAMI 2008

What do humans see?

René Magritte, Les valeurs personnelles, 1952

What do humans see?
What do humans see?

How hard is computer vision?

“In 1966, Minsky hired a first-year undergraduate student and assigned him a problem to solve over the summer: connect a television camera to a computer and get the machine to describe what it sees.”

Marvin Minsky, MIT
Turing award, 1969

How hard is computer vision?

“You’ll notice that Sussman never worked in vision again!” – Berthold Horn

Marvin Minsky, MIT
Turing award, 1969

Gerald Sussman, MIT

Computational photography

Vs.

Ansel Adams
Computational photography

Depth

Cameras

Course overview

• Emphasis on practical approaches
  – What is important to industry
• Gain intuition
• Less emphasis on “academic” problems
### Syllabus

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<th>Week</th>
<th>Topics</th>
<th>Reading</th>
<th>Assignments</th>
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<tr>
<td>Week 1</td>
<td>Introduction, Filtering, Sampling, Edge detection</td>
<td>Filtering: Szeliski (pp. 89-104) Sampling: Szeliski (pp. 127-141) Edge detection: Szeliski (pp. 210-219)</td>
<td>Filtering, Sampling, Edge detection</td>
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<td>Week 2</td>
<td>Geometric transformations, Interest point detection, Patch descriptors</td>
<td>Geometric transformations: Szeliski (pp. 29-54) Interest point and descriptors: Szeliski (pp. 183-209)</td>
<td>Interest point detection, Patch descriptors</td>
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<td>Week 3</td>
<td>Image formation, Cameras, Displays, Segmentation</td>
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<td>Segmentation</td>
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<td>Week 4</td>
<td>Feature-based alignment, Creating panoramas, Structure from motion</td>
<td>First assignment due: Image filtering and detecting edges</td>
<td>Creating panoramas, Structure from motion</td>
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<td>Week 5</td>
<td>Stereo vision, Optical flow</td>
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<td>Optical flow</td>
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### Grading

- **Four assignments (25% each)**
  - Mix of coding and written answers.
  - Using Qt (cross platform UI in C++) qt.nokia.com
  - Use of interactive UIs for exploring and gaining intuition

1. Filters and edge detection
2. Creating panoramas
3. Computing depth from stereo
4. Face detection

### Book (optional)

Good reference for latest works, and basic approaches.

Covers many areas not talked about in class.

Free online.

[http://szeliski.org/Book/](http://szeliski.org/Book/)