

Introduction to Computer Vision

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Lecture 1: Introduction

Goals for Today

What is vision?

What is computer vision?

What does it mean to see and how do we do it?

How can we make this formal (mathematical and computational)?

Staff

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Textbook

Computer Vision: Algorithms and Applications

Richard Szeliski

September 7, 2009

http://research.microsoft.com/en-us/um/people/szeliski/Book/drafts/SzeliskiBook_20090907_draft.pdf

For next class

Reading: Ch 1.1 for Friday

Background: Look over Appendix A.1. We'll be covering most of the material in Appendix A and B. We'll offer a linear algebra “refresher”.

Pay attention to light, reflection, and motion.

Look at different materials and think about how they reflect light.

Mathematics covered

Calculus (partial derivatives, Taylor series,...)

Geometry (perspective projection,...)

Linear Algebra (eigenvalues, SVD, pseudoinverse,...)

Optimization methods (Gauss-Newton, least squares,...)

Probability and Statistics (Bayes' rule, multivariate Normal, robust statistics, maximum likelihood...)

A linear algebra tutorial will be scheduled.

Grading

10% Class participation

15% Homework assignment 1

15% Homework assignment 2

15% Homework assignment 3

15% Homework assignment 4

30% Project

Note: you
can't get an
A if you get
0 for
participation!

Graduate credit available – more
expected in the final project;
presentation of final project.

Class participation

Why do I care?

- * everything is in the lectures
- * computer vision is not a solved problem and there is no set curriculum. I want you thinking and questioning.

What is participation?

- * attend class
- * ask and answer questions
- * we will solve some problems in class

Assignments

Programming will be in Matlab

- resources on the web
- We'll organize an evening Matlab intro/tutorial

Check the web page regularly

<http://www.cs.brown.edu/courses/cs143/>

Reading week

- No class during reading week.
- You'll be working on final projects.

Collaboration Policy

- I encourage interaction both inside and outside class. We will all learn more by talking over ideas and problems.
- Assignments and the project, however, are to be done on your own. You may ask people for help with general concepts and Matlab programming but **your work (including your Matlab code) must be your own.**
- The web is a great resource but don't be tempted to look for solutions to homework on the web. It is a violation of the academic code to appropriate material from the web. Be careful not to take code or text from the web. **Anything you get from anywhere else should be scrupulously cited.**
- If you are ever unsure about what are appropriate interactions, please discuss the situation with me
- Make sure the your directories with coursework are protected.

Late Policy

- Late assignments will not be accepted without **prior** approval.
 - Get prior approval.
 - No exceptions.
 - I am ruthless.
-
- Assignments are in pieces that build on each other and have different due dates – need to keep up.

More vision

- Vision list
 - BROWN-VISION@listserv.brown.edu
- Center for Vision Research
 - <http://www.cvr.brown.edu>
- Computer Vision Reading Group List
 - CSCV-READING-GROUP@listserv.brown.edu

Why study CV?

Science

Foundations of perception. How do we see?
Perception is fundamental – entwined with reasoning.

Engineering

How do we build systems that perceive the world?
Camera are proliferating. “Images” are ubiquitous.

Applications

Medical imaging, surveillance, entertainment, graphics,...

Jobs: The market is good.

What does it mean to see?