Welcome to Computational Vision CSCI 4270 and 6270: Course Mechanics

Professor Chuck Stewart

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Lecture Overview

- Part 1:
  - People and schedules
  - About me
  - Course mechanics and administrative details
- Part 2:
  - Introduction to computer vision
- Part 3:
  - Introduction to NumPy

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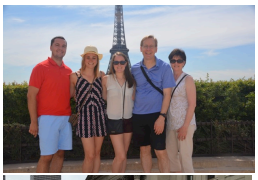
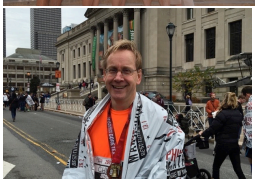
About Me…



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Wildbook Computer Vision Algorithms: From Images to Individual Identities




The Ohio State University · Princeton University · Rensselaer · WILDME

National Science Foundation · Microsoft Research · DL PEJETA CONSERVANCY · MPALA

WWF · The Ocean Foundation

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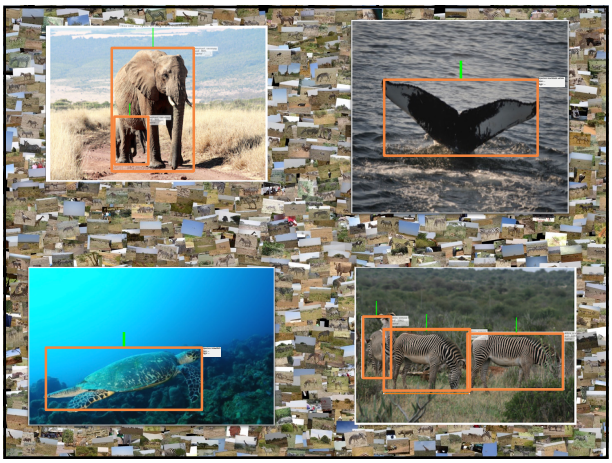

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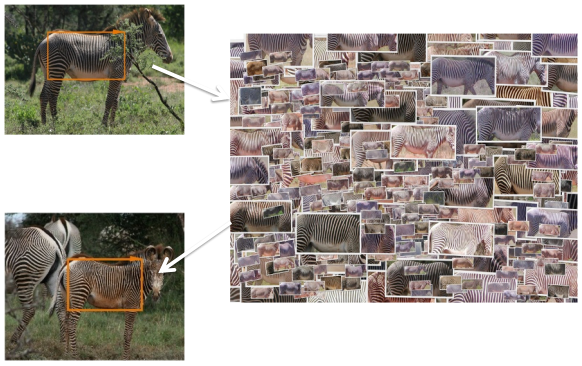

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About Me…

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Dates, Times, URLs

- Class:
  - Mon, Thurs 2:30-4:20 on WebEx
  - All lectures recorded and linked from Submitty
- Submitty:
  - *https://submitty.cs.rpi.edu/courses/s21/csci4270*
- Email: *stewart@rpi.edu*
- WebEx office:
  - *https://rensselaer.webex.com/meet/stewart*
- Office hours:
  - Mon 4:30 – 5:30
  - Wed 1:30 – 3:30
  - Daily checking of Submitty discussion boards, late in the work day

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Learning Objectives

At the end of this course, each successful student will be able to

- Apply techniques of calculus and linear algebra to solve problems involved in building the components of a computer vision system.
- Develop efficient algorithms for solving problems in computer vision.
- Write small-sized and intermediate-sized programs for solving problems in computer vision.
- Map potential applications of computer vision into specific technical problems.

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Learning Objectives (cont)

- Assess the difficulty of specific technical problems in computer vision and select potential solution techniques.
- Discuss thoughtfully some of the social implications of advanced computer vision technology.
- (6270 only) Evaluate the significance of the ideas and the thoroughness of the experimental analysis of a current research paper in the computer vision field.

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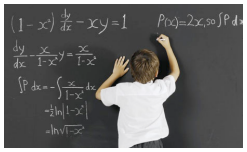
Pre-requisites

- Computer Science
  - Intro programming, esp. Python!
  - Data structures
  - Algorithms
- Mathematics
  - Calculus
  - Multivariable and linear algebra



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Requirements – 15% Lecture Exercises and Participation

- Lecture Exercises:
  - Short problems at end of lecture
  - Due 24-48 hours
  - Gently graded
  - Two "worst days" dropped
- Participation:
  - Questions during lecture
  - On-line discussion

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Requirements – 85% Homework and Programming Assignments

- 7 assignments – see syllabus for tentative dates
- Analysis, algorithms, programming and evaluation
  - "Break" your algorithms and code
- Late homework:
  - Four free late days; at most two per assignment
  - After using these 20% per day or part day

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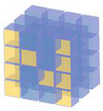
Programming

- Python 3.8.x
  - Be sure you are here!!!
- Packages:
  - OpenCV
  - Matplotlib
  - Numpy
  - Scipy
- Recommend Anaconda tools
  - http://continuum.io/downloads
- Install OpenCV
  - Instructions in syllabus
- Also recommend use of virtual environments



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Undergraduate vs. Graduate Level

- Common lectures
- Mostly common homework
- Additional requirements for graduate level in each homework

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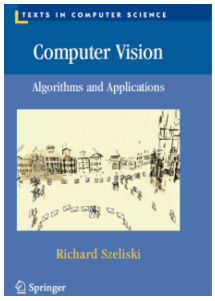
No Textbook

- Some background material will reference Rick Szeliski's textbook
  - On-line version at http://szeliski.org/Book/
- Other material will be through papers and on-line references
- Students are strongly encouraged to seek and share their own references
  - Post what you find on Piazza!



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Academic Integrity (from Syllabus)

- Guidelines:
  - Unless otherwise specified, students are expected to submit their own solutions and write-ups. Students may work together to understand problem requirements, to sketch solution ideas, and to discuss results. Implementations and write-ups must be done individually. Automatic comparison tools such as MOSS will be used to find and compare submissions that are overly similar. Students who find outside resources to help in solving homework problems must reference these resources in their write-ups and make clear what they did individually in addition to what the resource did.
- Penalties:
  - The standard penalty for violating these rules will be a 0 on the entire assignment --- not just the part that involves the academic integrity violation --- along with a report to the Dean of Students office.

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Class

- Two more "sub-lectures" of 50 minutes or less, each followed by Q&A
  - Questions welcome in the middle of lecture too!
- Lecture notes posted ahead of class
- Most code written in class will be posted afterwards
- All lectures will be recorded, with links from the Submitty page

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Heavy Use of Submitty

- https://submitty.cs.rpi.edu/s21/csci4270/
- All material will be posted here, including
  - Lectures
  - Homeworks
  - Data
  - Announcements
- Questions and answers for the discussion area:
  - Clarification on homework questions: Yes
  - Clarification or further explanation of class material: Yes
  - Pointers to good resources: Yes
  - General hints on homework solutions: Yes
  - Questions on OpenCV, Python, NumPy, SciPy: Yes
  - Specifics on solutions to homework: NO!
  - Source code for homework solutions: NO!
- Posting can be anonymous to the rest of the class, but not to me!
- If you have a question on course, on lecture notes, or on homework, post it to Submitty!
  - Other students may answer long before I do
  - I will answer questions on Submitty (at least once per day), usually late in the afternoon!

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