Computer Vision Project

# Final Project Presentations + Papers
# Available Code Resources and Databases

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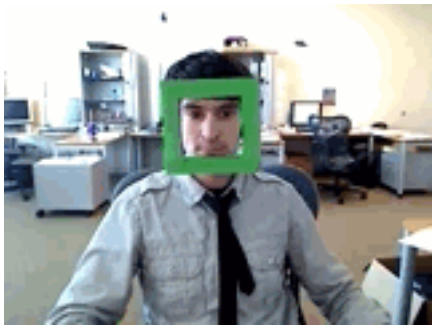
# Project Ideas

- Tracking



- Human Detection/Tracking (w Kinect)

http://www.ros.org/wiki/mit-ros-pkg/KinectDemos

# Tools, Code - Geometry

- Camera Calibration Toolbox

http://www.vision.caltech.edu/bouguetj/calib_doc/

- Relative orientation from 3 points

http://lear.inrialpes.fr/people/triggs/src/

- Relative pose from 5 points
- http://www.vis.uky.edu/~dnister/Executables/RelativeOrientation/index.html

# Detectors and Descriptors, Matching

- SIFT, SIFT ++ , clustering, segmentations, Approximate Nearest Neighbour
- http://www.vlfeat.org

- Matching with Shape Context
- http://www.eecs.berkeley.edu/Research/Projects/CS/vision/shape/sc_digits.html

- Spatial pyramid Matching
- http://www.cs.unc.edu/~lazebnik/

# Segmentation

- Segmentation

http://www.cis.upenn.edu/~jshi/software/

- Berkeley Segmentation Engine

http://www.cs.berkeley.edu/~fowlkes/BSE/

- Color based segmentation

http://people.cs.uchicago.edu/~pff/segment/

- Geometric Context – Semantic Segmentation

http://www.cs.uiuc.edu/homes/dhoiem/

# Object detection and Recognition

- Part Based Models
  http://people.cs.uchicago.edu/~pff/latent/
- Histogram of oriented gradients
- http://www.robots.ox.ac.uk/~vgg/research/caltech/phog.html
- Tutorial on Object recognition
- http://people.csail.mit.edu/torralba/shortCourseRLOC/
- Pedestrian Detection
- http://www.cs.berkeley.edu/~smaji/projects/ped-detector/

# Trackers

- GPU based implementations
- http://cs.unc.edu/~ssinha/Research/GPU_KLT/
  http://www.ces.clemson.edu/~stb/klt/

# Datasets

- Category Recognition
  http://www.vision.caltech.edu/html-files/archive.html
- Label Me
- http://labelme.csail.mit.edu/

- PASCAL
- http://pascallin.ecs.soton.ac.uk/challenges/VOC/databases.html

# Project Presentations

- Use MS Powerpoint
- Mail to kosecka@cs.gmu.edu by 11:59pm, on the presentation due date
  - PPT file
  - All animations/videos (links please)
- We will determine time limit base on number of groups
- Time limit will be strictly enforced

# Final Project Slides

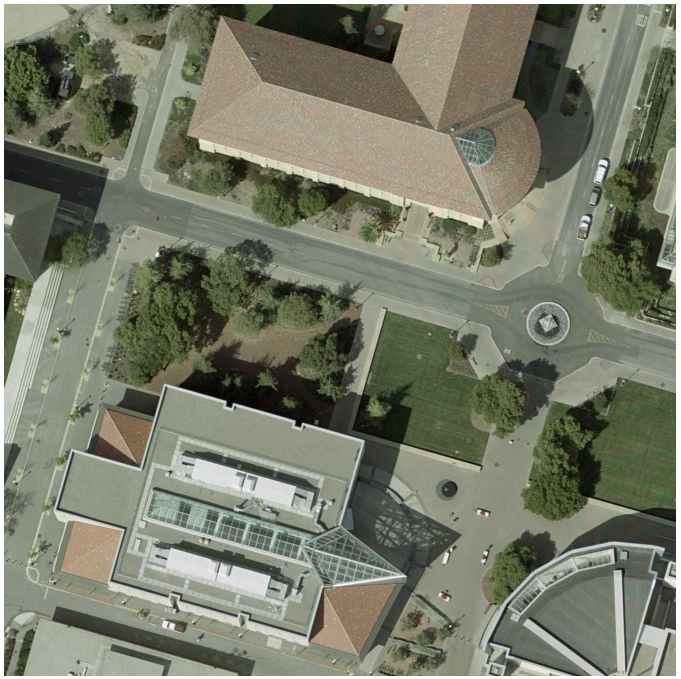
- Prepare around 1 (or less) slide per minute
- 1 Slide with title + team member names
- Slides with problem statement and data samples
- Slides describing your approach
- 2-3 slides with results, animations?

- (hidden slide: list percentages of who in your team did what, e.g.: Dave did 80% of the work, Mike and Ron each 10%)

# Example Presentation

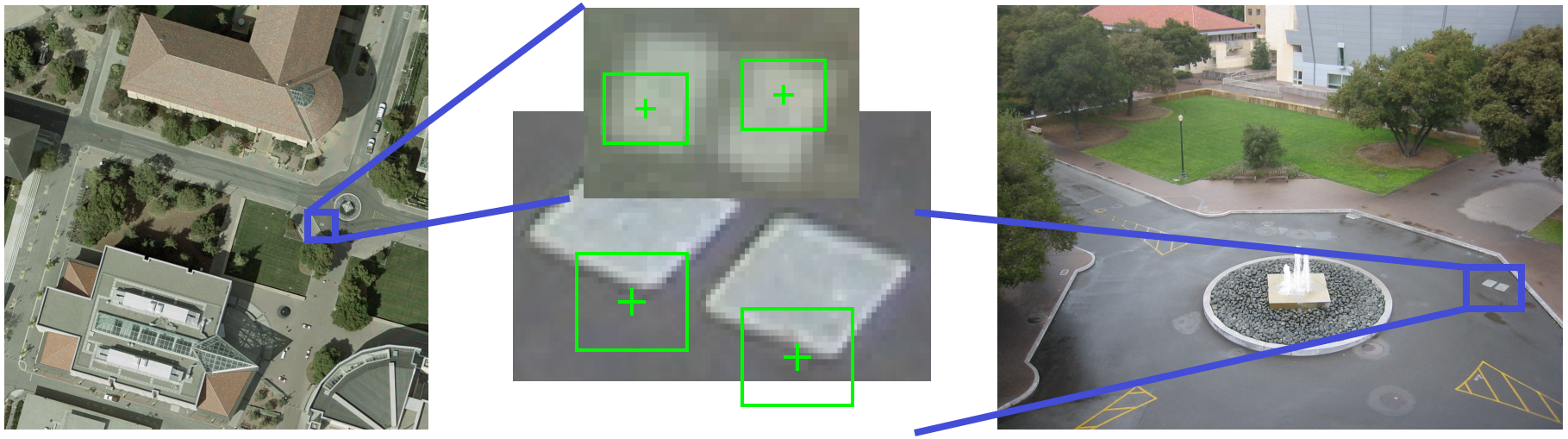
(Dan Gindikin, CS223b 2004)

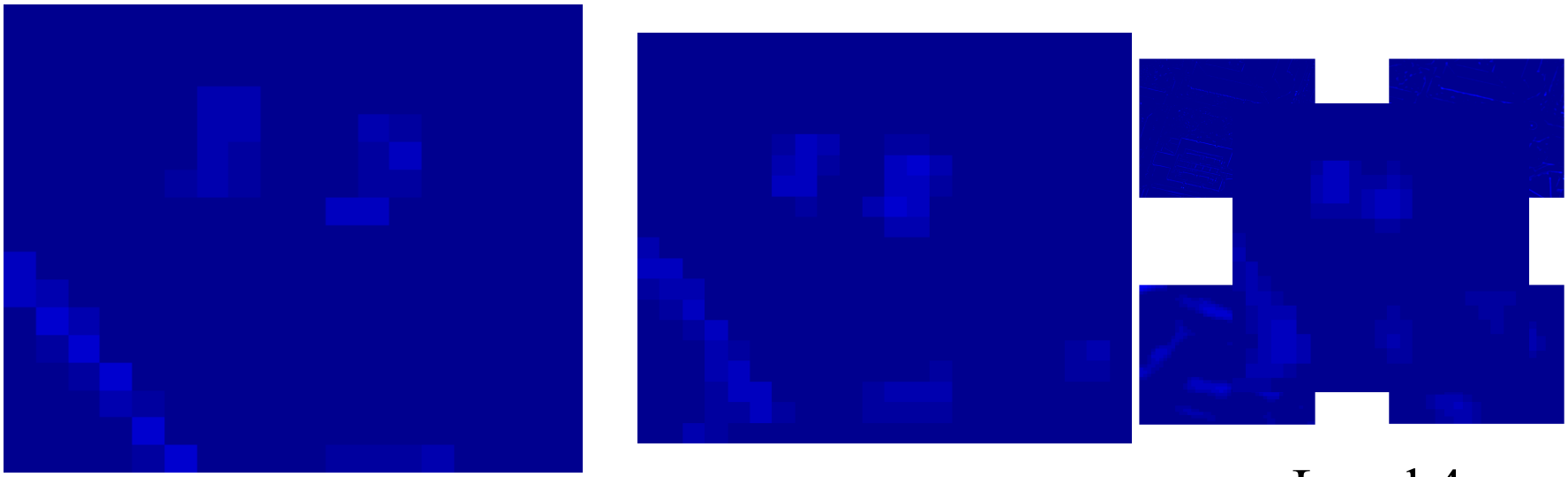
# Problem: Matching Images to Aerial Maps



$$R\begin{bmatrix} x' \\ y' \\ z' \end{bmatrix} + T = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

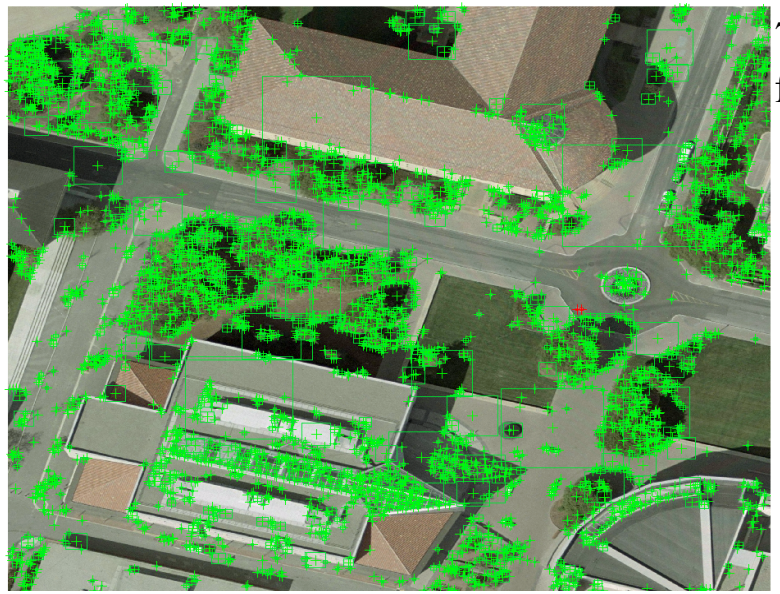
# Approach: SIFT



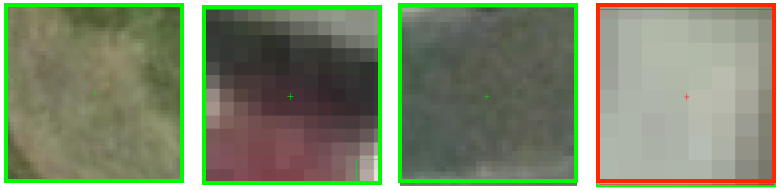


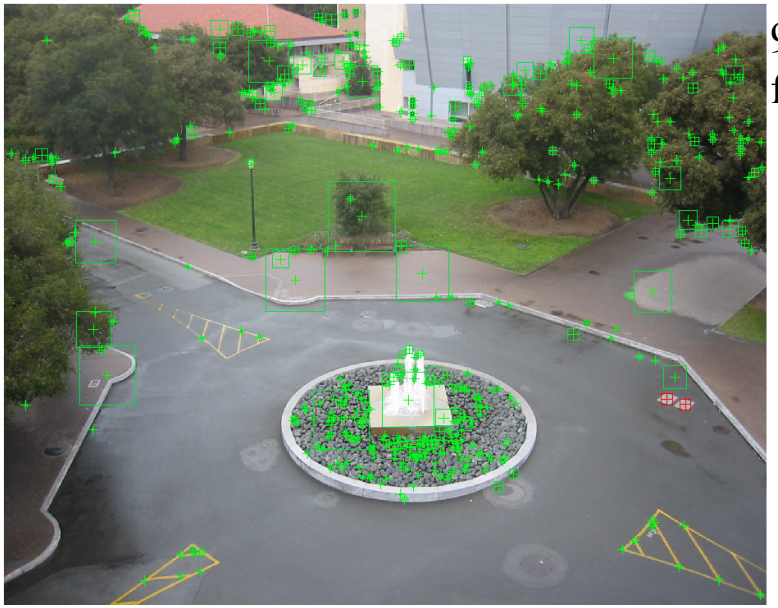
Level 2 Level 3 Level 4

# Results

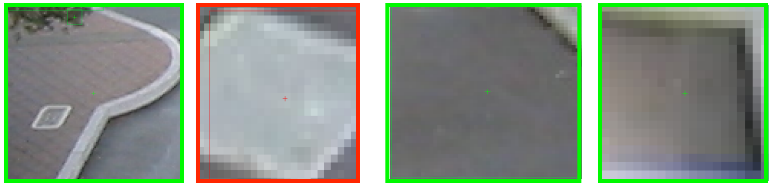


7690 features





968 features



# Final report

# Your Final Project Paper On-A-Slide

- Abstract
  - Problem, gap, approach, key results
- Introduction
  - Broad problem and impact
  - summary approach (should include reference to technical gap)
  - key results
- Approach
  - Background tutorial (if necessary)
  - Your technical innovation (might be multiple pages/sections, with repeated reference to scientific gap)
- Results
  - Data sets, simulator, implementation details
  - Empirical results (might be multiple pages)
- Related Work
  - Don't just say what's been done. Point out how prior work relates to yours and to the scientific gap you set forth in the intro.
- Summary/Discussions/Conclusion
  - Summary problem, approach, result, in past tense
  - Discuss open questions, promising research directions
- References

- It doesn't matter how you got there
  - "We tried A, it didn't work, therefore we tried B"
  - "B works. To see, let us consider an obvious alternative A, and show A does not work"
- Document your progress, not just achievement
  - "B works"
  - "B improves over A (current techniques) by X, which is important because of …"
- Resist the temptation to say everything you know.
  - A good paper makes one point, not two
  - A good paragraph makes one point, not two
  - (most points are only made in one paragraph, not too)

# Completeness and Conciseness

- Provide Problem motivation
- Describe Significant application domains
- Introduce the State of the art/background material
- Use Consistent Notation
- Make sure your experiments match your claims
- Describe and motivate your measures for evaluation
- Pick informative title
- A picture is worth 1000 words
- Be concise! Get to the point!
- Run a spell and grammar checker
- Use terminology consistently
- Define abbreviations, avoid them if possible