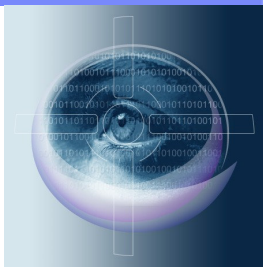
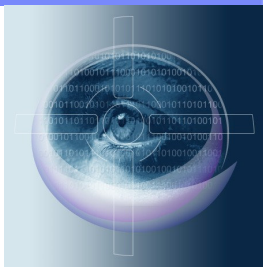


Class Overview and Project Ideas



Grading

60% Project
30% Homework Assignments
10% Class Participation

Homework Assignments

Three short written assignments (1-page paper reviews), each one corresponding to 10% of the grade.

Late Policy

Assignments must be submitted by email to all three instructors by midnight on the date specified. Late assignments will be penalized according to the following schedule:

0-24 hours	0.9
24-72 hours	0.7
72-168 hours	0.5
>1 week	0.0

Projects

- Individual or teams of two

Project Proposal and schedule (10% of the grade)

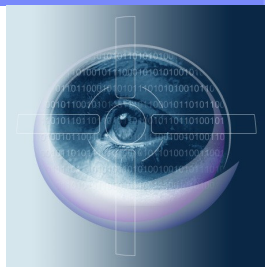
Part-way Project Evaluation (10% of the grade)

Final Project Evaluation and Report (40% of the grade)

- In case the project is done in teams of two, the final report needs to clearly specify the contribution of each student

- You need to implement your own code. If you want to use source code from the web (and enhance it), you need to get our approval first.

Schedule (Tentative)



28 Jan: Introduction to video surveillance. Course overview & grading. Project suggestions. Demonstration of the IBM Smart Surveillance Solution. *(Andrew / Rogerio / Yingli)*

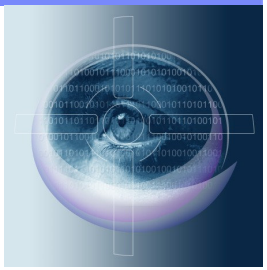
4 Feb: Object detection: Image differencing, Background subtraction (*Yingli*)
(HW #0 due)

11 Feb: Object detection: Advanced background subtraction and alerts (*Yingli*)
(HW #1 due)

18 Feb: Tracking: assignment problem and dealing with splits and merges (*Andrew*)

25 Feb: Tracking: other techniques and alerts (*Andrew*)
(HW #2 due)

3 Mar: Face detection and tracking (*Rogerio*)
(Project Proposal due)



10 Mar: Object classification (*Rogerio*)
(HW #3 due)

17 Mar*: Spring Recess*

24 Mar: Behaviour analysis (*Rogerio*)

31 Mar: Moving cameras : Active control (*Andrew*)

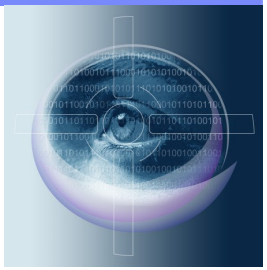
7 Apr: Multiple cameras: camera hand-off and simple calibration (*Rogerio*)

14 Apr: Architecture, Database and user interface. Search/Retrieval. (*Yingli*)
(Project Report / Mid-Evaluation)

21 Apr: Privacy protection & social issues in video surveillance (*Andrew*)

28 Apr: Application domains: public sector, retail, meeting mining. Commercial Systems (*Yingli*)

5 May: Catch-up. Emerging topics and future directions (Andrew / Rogerio / Yingli)
(Projects: Final Evaluation and Report)



Project Ideas

Abandoned / Removed Object Detection

PETS 2006 Proceedings and dataset:

http://www.cvg.rdg.ac.uk/PETS2006/

I-LIDS Bag and Vehicle detection challenge:

http://www.elec.qmul.ac.uk/staffinfo/andrea/avss2007_ss_challenge.html

Pedestrian Detection

Patterns of Motion and Appearance (ICCV 2003):

http://research.microsoft.com/~viola/Pubs/Detect/violaJonesSnow_ICCV2003.pdf

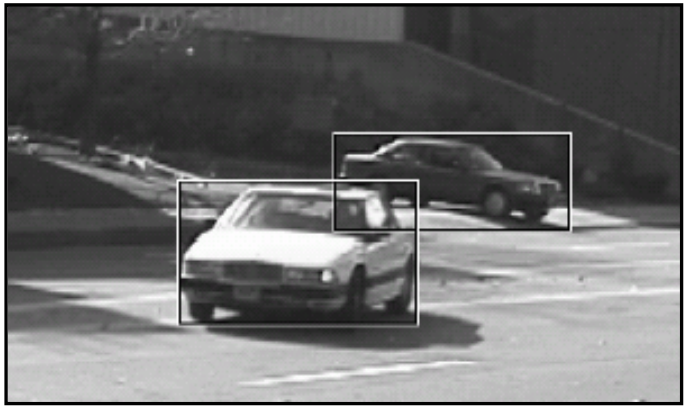
Dalal and Triggs Source Code (CVPR 2005):

http://pascal.inrialpes.fr/soft/olt/

Dataset / Experimental Study:

http://www.science.uva.nl/research/isla/downloads/pedestrians/

Car Detection



We may provide a large car image database for training purposes.

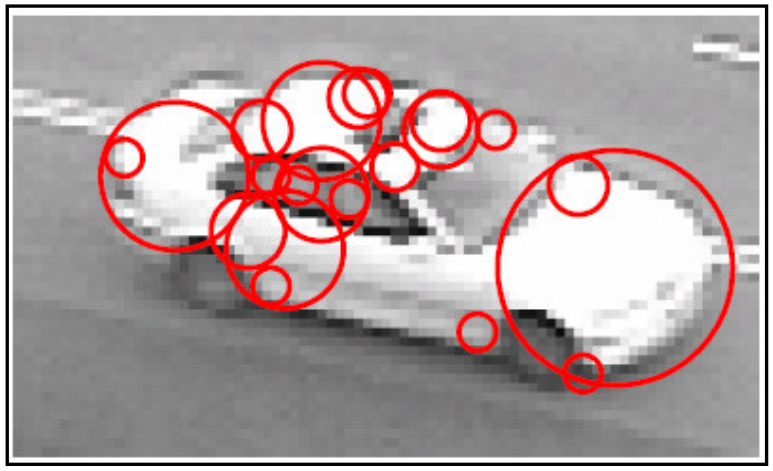
An Exemplar Model for Learning Object Classes (CVPR 2007):

http://www.robots.ox.ac.uk/~vgg/publications/papers/chum07a.pdf

Henry Schneiderman Work:

http://www.cs.cmu.edu/afs/cs.cmu.edu/user/hws/www/CVPR00.pdf

Vehicle Classification



Main Idea:

Classify a car image into sedan, mini-van, bus, taxi, etc.

Edge Points and SIFT descriptors (ICCV 2005):

http://people.csail.mit.edu/xiaoxuma/proj/vehi_reco/MaGrimson_ICCV05_VehicleReco.pdf

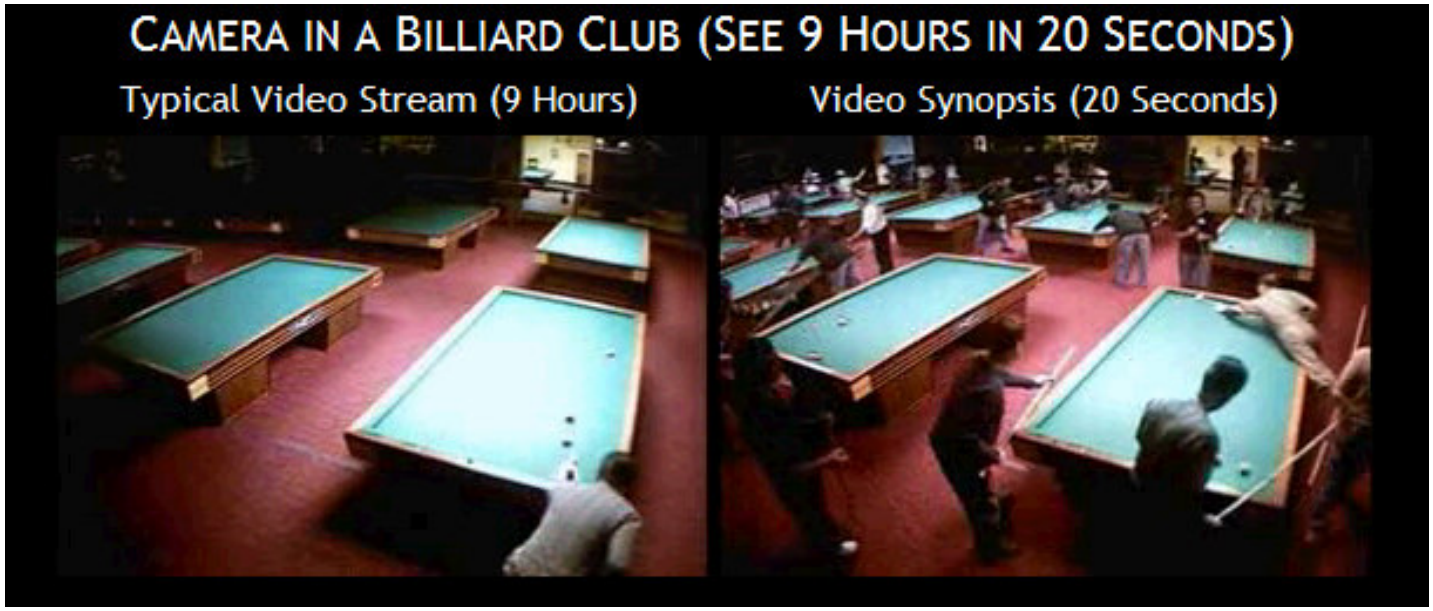
Gender Determination

http://vis-www.cs.umass.edu/lfw/

More than 13000 labeled faces found with Viola-Jones method.

Use names to get gender!

Video Summary

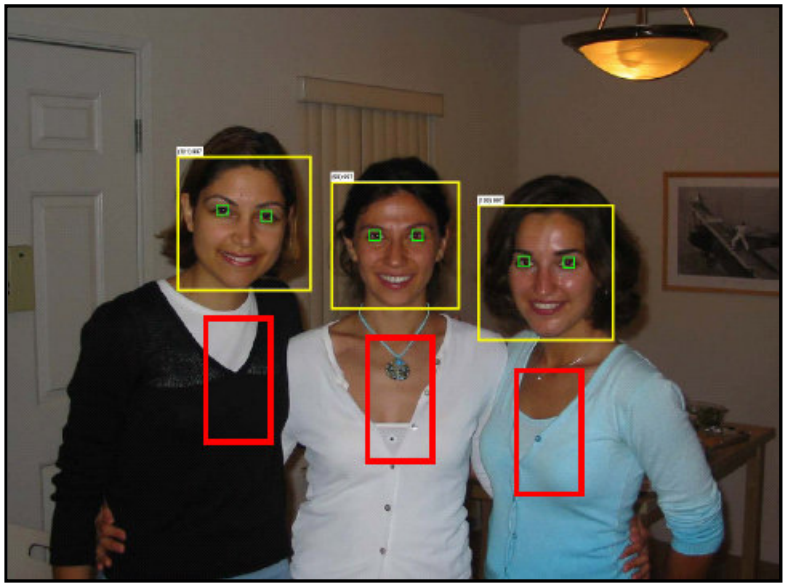


Object-based video summary (ICCV 2007):

http://www.vision.huji.ac.il/video-synopsis/

Cross-Camera Tracking

Exploiting clothing



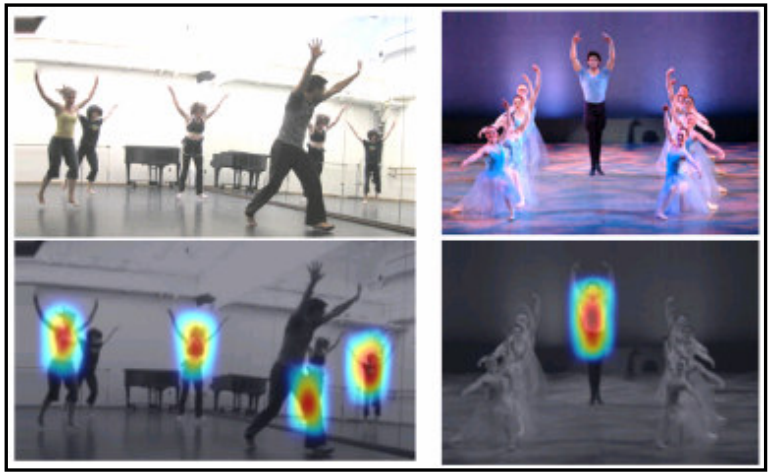
Color Matching and auto-calibration (ECCV 2006):

http://personal.ee.surrey.ac.uk/Personal/R.Bowden/publications/eccv06/GilbertBowdenECCV06.pdf

Exploiting clothing for short-time person recognition (CVPR 2007):

http://robotics.stanford.edu/~drago/Papers/cvpr2007.pdf

Activity Recognition



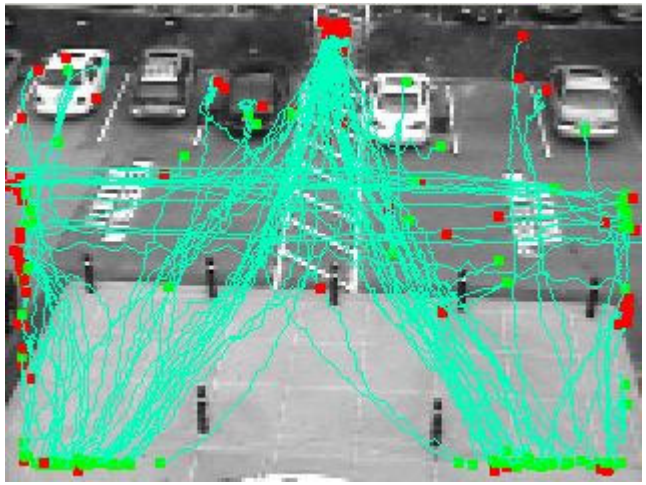
Falling Person Detection?

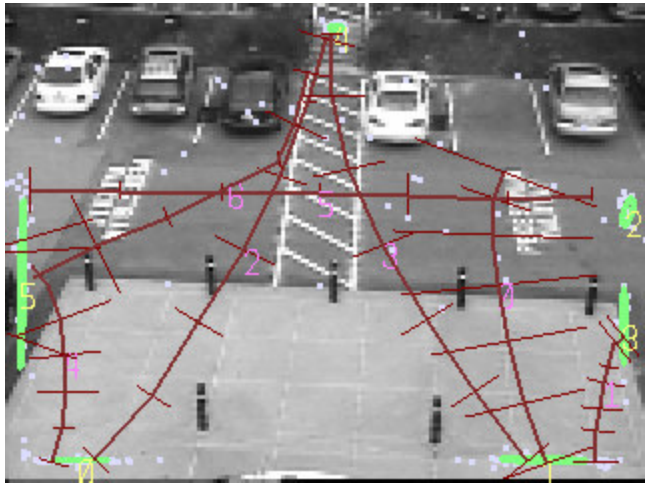
Action detection via local self-similarities (CVPR 2007)

http://www.wisdom.weizmann.ac.il/~vision/SelfSimilarities.html

Recognition of Visual Activities and Interactions by Stochastic Parsing (Ivanov and Bobick, 2000)

Track Clustering and Anomaly Detection





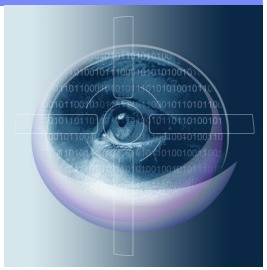
Observe behavior of tracked objects and learn “normal” patterns of activity

Flag alerts for abnormal patterns

Trajectory data:

http://ngsim.camsys.com

Other ideas



- Visual crowd analysis (crowd formation, tracking, etc.)
- Processing video from a vehicle-mounted camera
- Robust background modeling (in presence of waves, moving trees, etc.)
- Advanced tracking techniques
- Moving camera control processing
- etc.

You may come up with your own proposal!