Course so far

Image formation and color!

Filtering!

Image frequency!

Feature points!

Bags of words!

Classifiers!

Sliding windows!

Course coming up

Neural Nets

Convolutional Neural Nets

- Project 4

Current state of the art

- - -

Camera geometry - Project 5

WebGazer – Project 6 (not very long)

Projects Details

- Coding projects (7 total) + Final Examination

- Project 0: MATLAB intro
- Projects 1-5: Structured conceptual / code
- Project 6: Group challenge

Related Materias

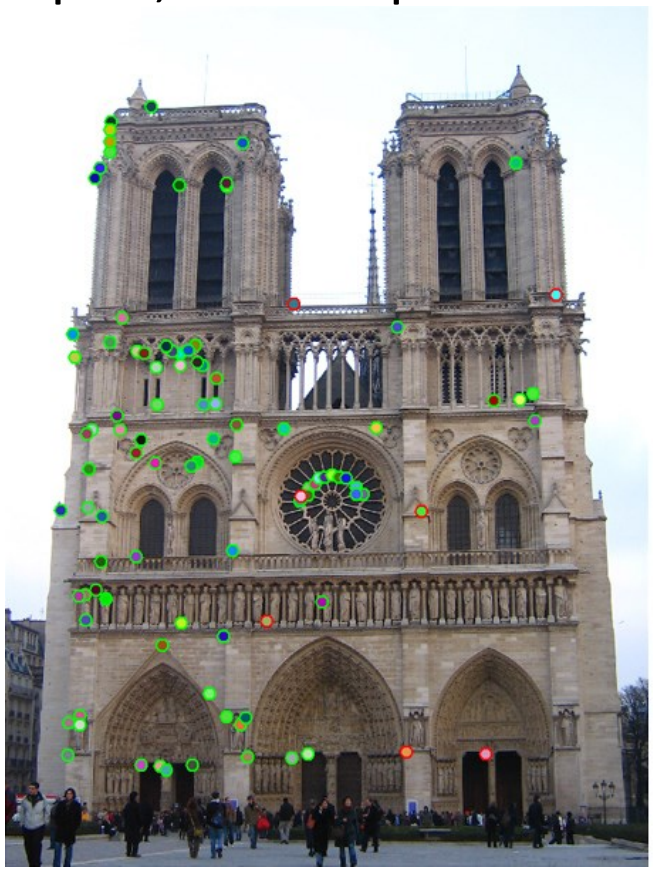
- Online archive

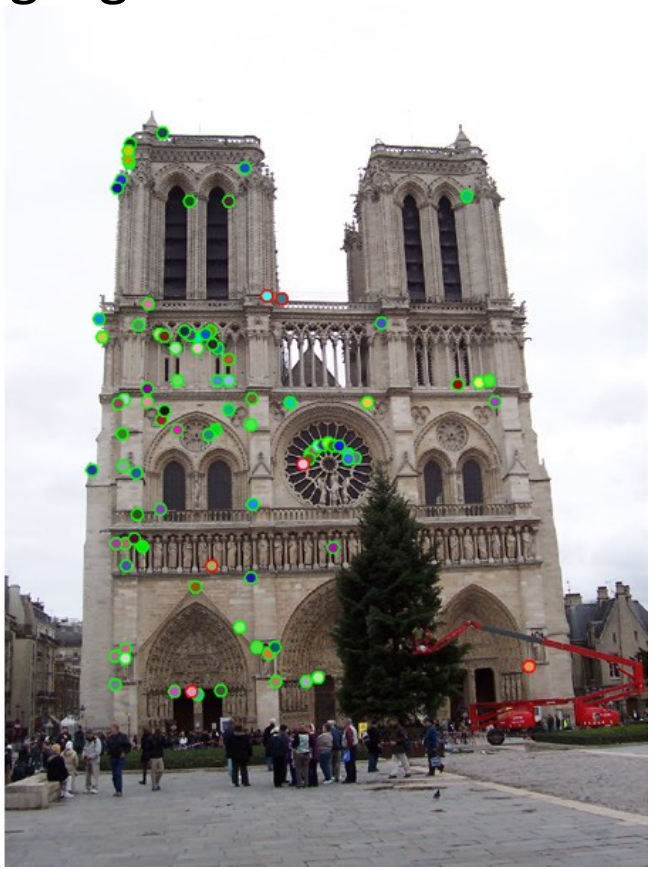
Proj 1: Image Filtering and Hybrid Images

- Implement image filtering to separate high and low frequencies.
- Combine high frequencies and low frequencies from different images to create a scale-dependent image.

Proj 2: Local Feature Matching

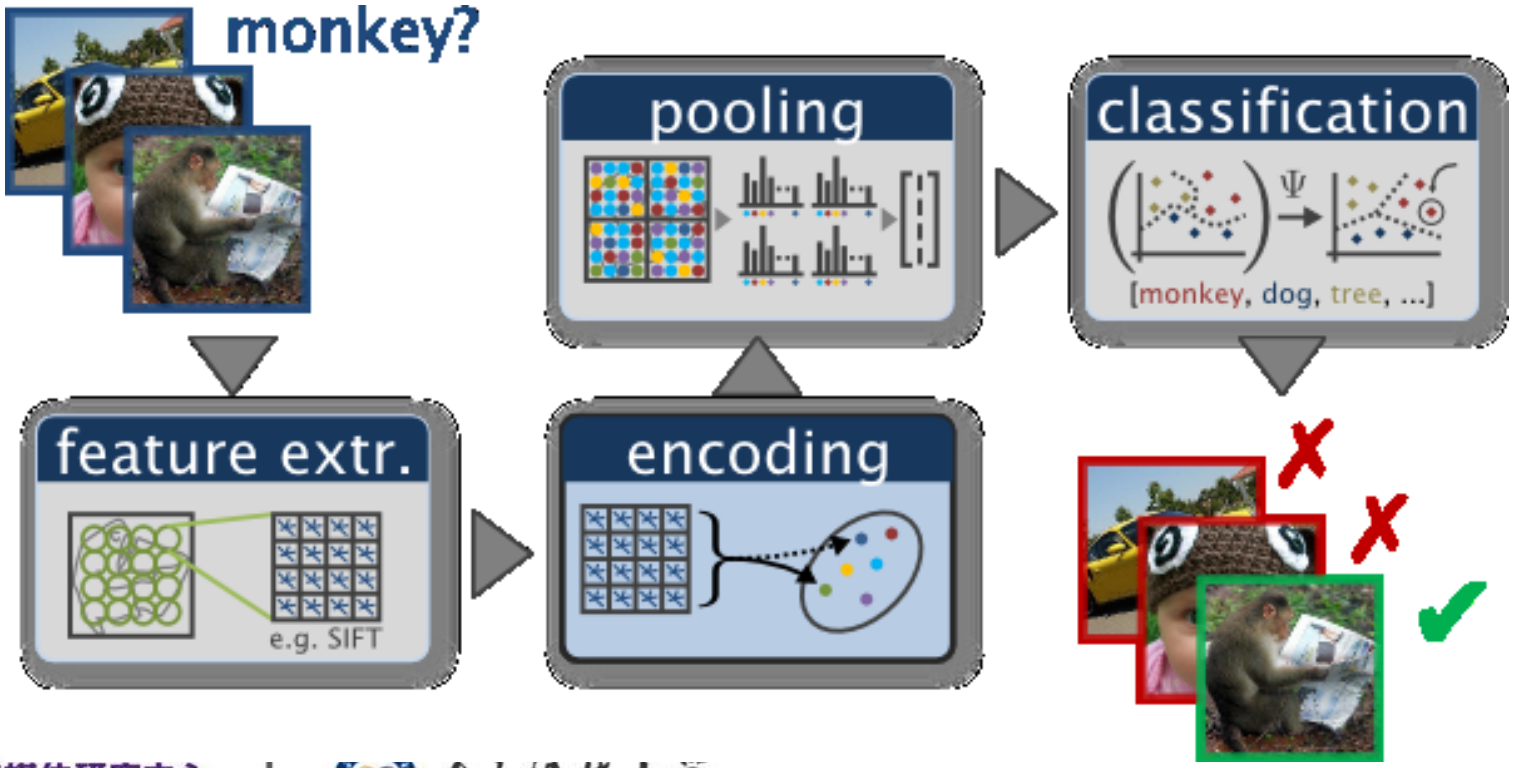
- Implement interest point detector, SIFT-like local feature descriptor, and simple matching algorithm.





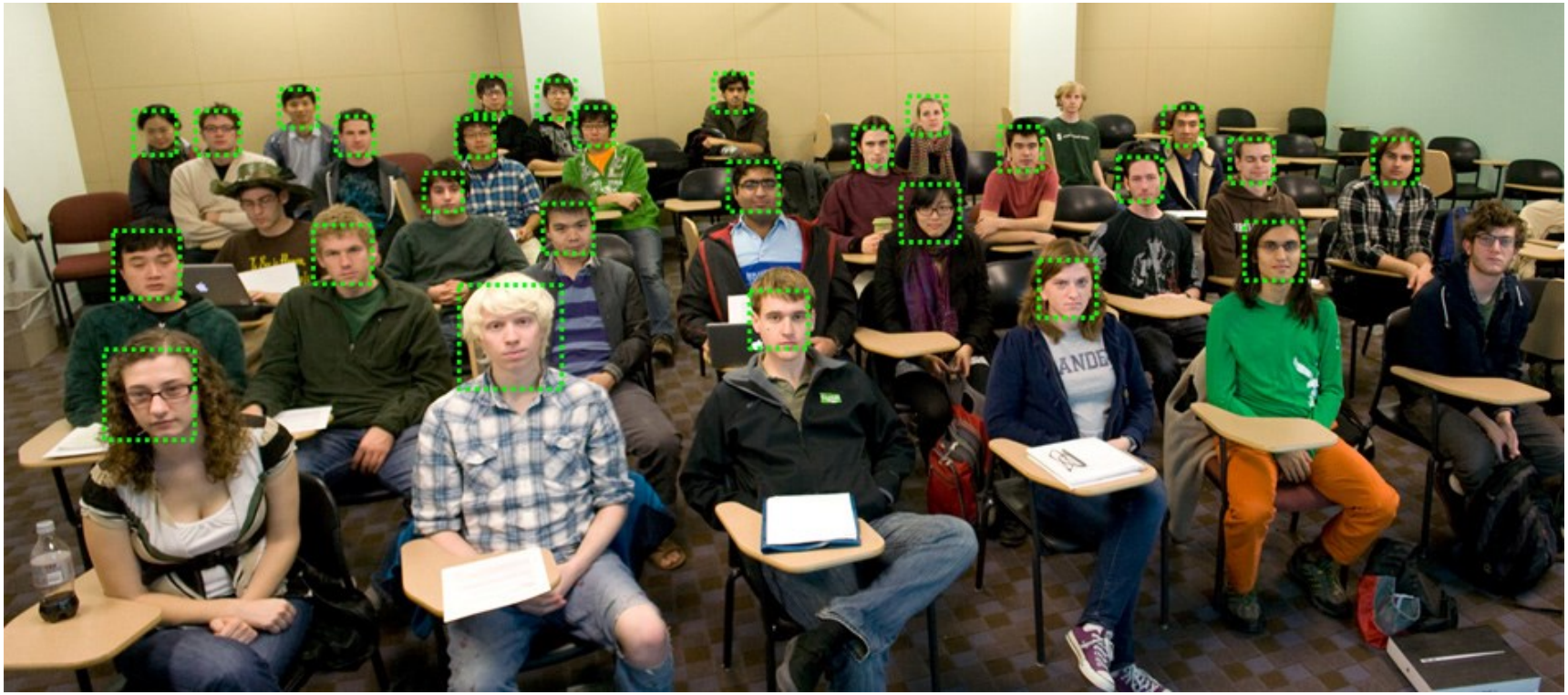
Proj 3: Scene Recognition with Bag of Words

- Quantize local features into a “vocabulary”, describe images as histograms of “visual words”, train classifiers to recognize scenes based on these histograms.



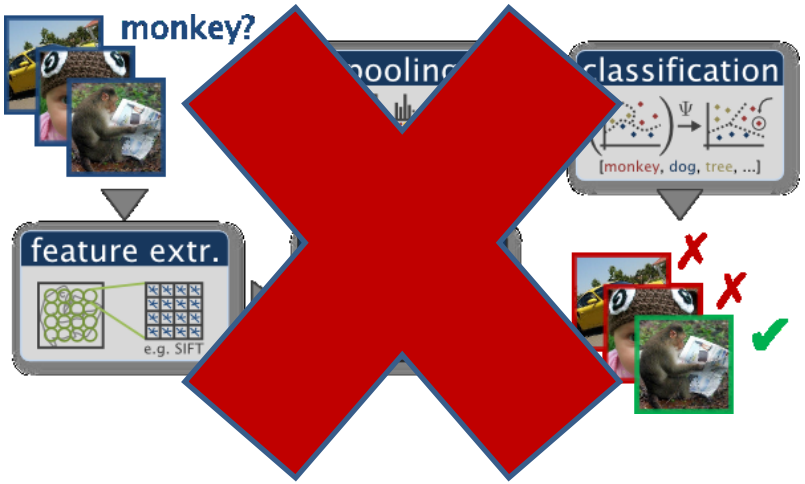
Proj 3b: Object Detection with a Sliding Window

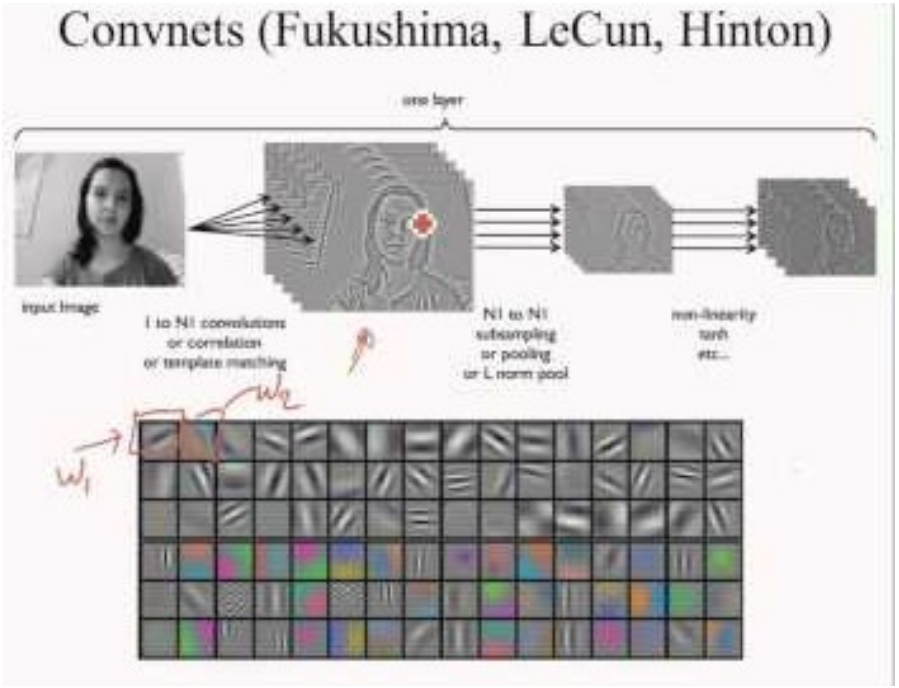
- Train a face detector based on positive examples and “mined” hard negatives, detect faces at multiple scales and suppress duplicate detections.



Proj 4: Convolutional Neural Nets

- Proj 3 again, but state of the art.





Proj 5: Multi-view Geometry

- Recover camera calibration from feature point matches.
- Foundation for almost all measurement in computer vision.

Proj 6: Group challenge

- Improve WebGazer:
  A real-time Web-based eye tracker.