Detecting/tracking objects in images by averaging shape

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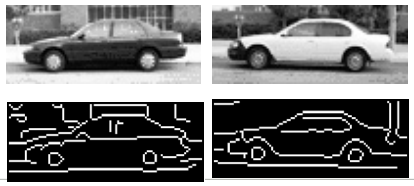
STEVENS Institute of Technology
Research & Entrepreneurship Day 2008

Introduction

The **outlines** of an imaged object are useful to specify its **shape**, to **recognize** it in new images, and to **track** it in movies. But outlines are hard to extract reliably from images (often just fragments are recovered) and they vary and distort between images



Technique

1) Instead of matching outline fragments, we **match images globally** by decomposing them into homogeneous regions. We **match decompositions** (via mutual information), not outlines.

Decomposition of Car image

2 possible matches

Match (above): Superimposed decompositions are *simpler*

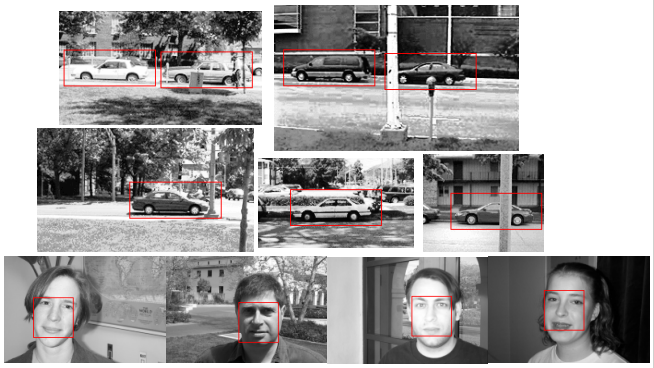
Result: **Shape matching** sensitive to shape details, **immune to bad outlines and shape distortions** between images.

2) Breaking up an image into regions causes errors. To avoid these, we approximately **average over all image decompositions** (efficient closed form solution)

3) We apply our approach for:
Detecting objects in images
Tracking objects across a movie
Identifying significant image parts

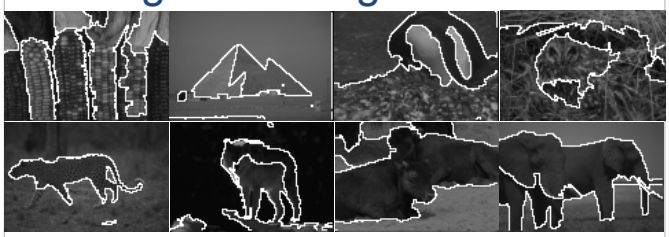
Results

- Car and face detection



- Object tracking

- Significant regions



Conclusion

Previous methods couldn't easily **detect or track objects by shape**. We track objects against others of similar appearance, despite shape distortions and occlusion by intervening objects.