OBJECT BANK:A high level image representation for scene classification and semantic feature sparsification

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Motivation

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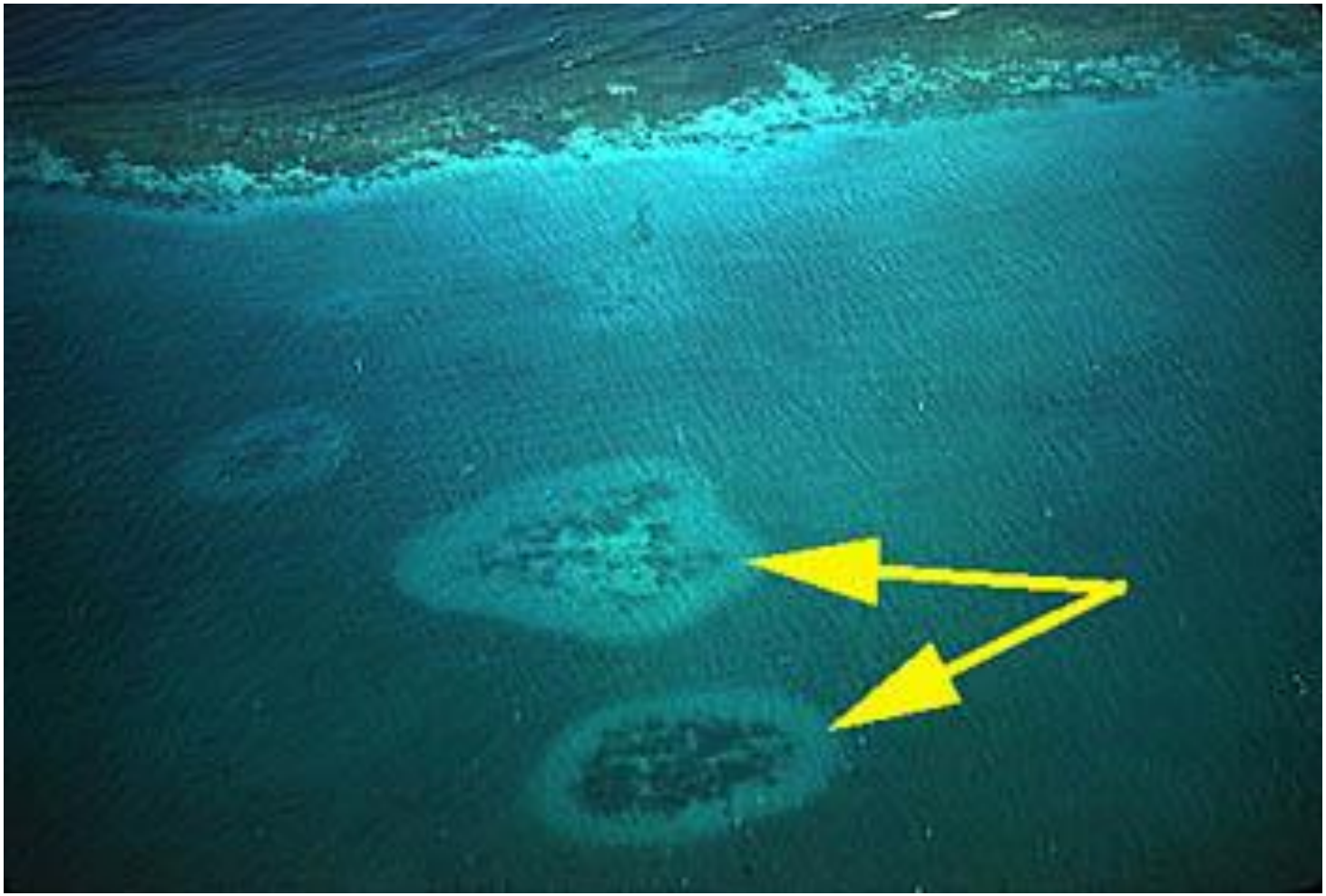

Motivation

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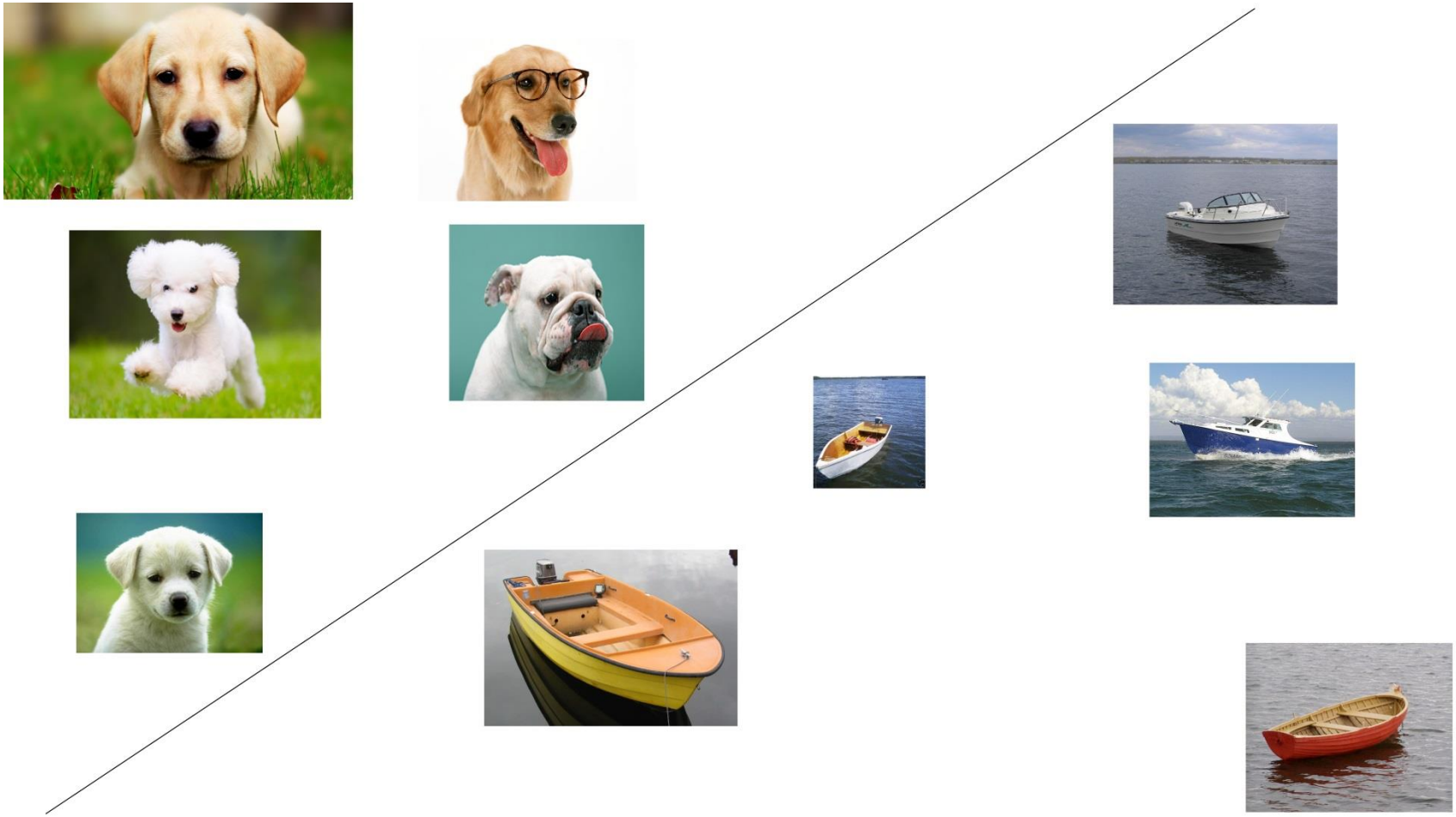
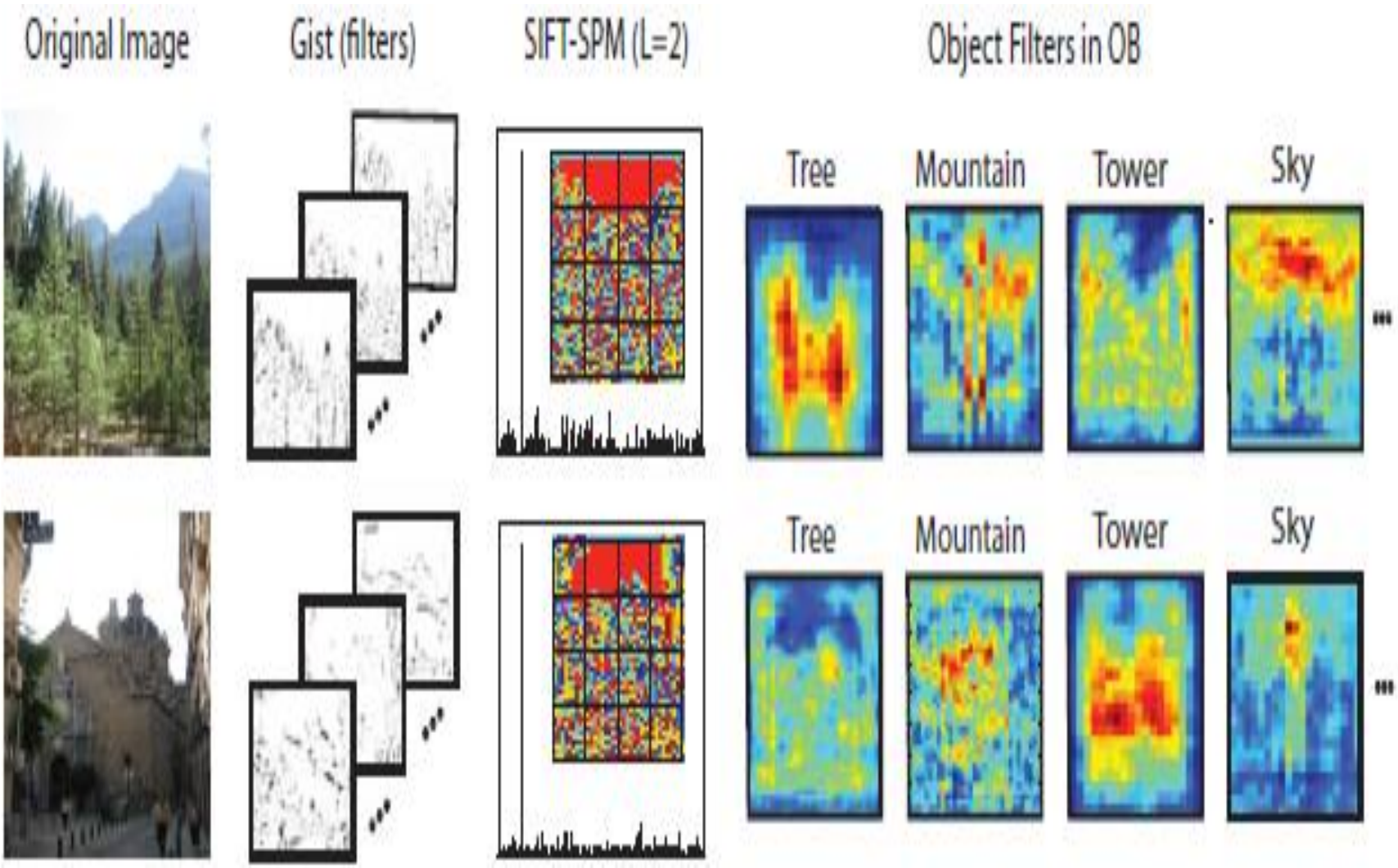
Object Bank

- Off the shelf classifiers such as LR and SVM
- Provides superior performance on high level visual recognition tasks
- Used sparsity algorithms to make this work more efficient and hence scalable for large scale datasets

A typical Classification Task



Comparisons!



Object Bank

<u>An image is represented as a scale invariant response map of a large number of pre-trained generic object detectors</u>

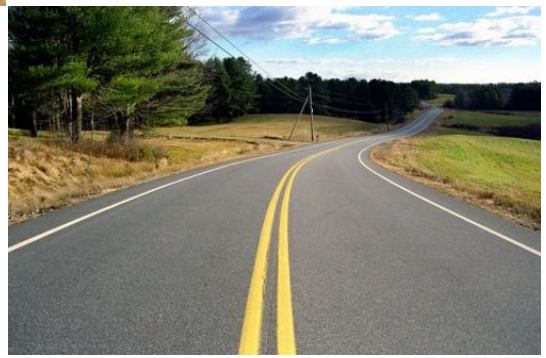
Object Bank

The Object Bank Representation of Images

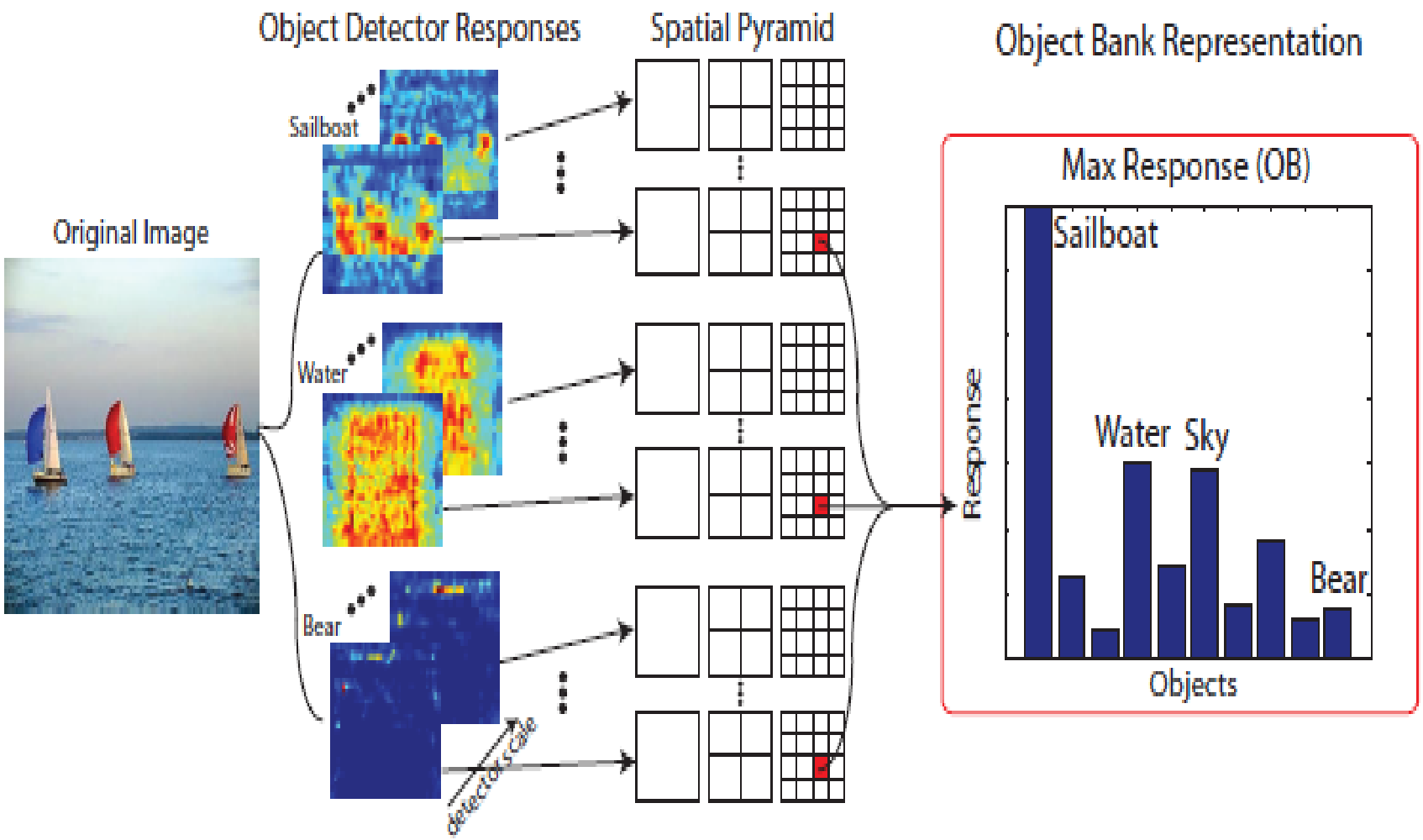
- Pre trained detectors are outsourced

Latent SVM detectors (Felzenszwalb et. al. TPAMI 2010)

Texture Classifier
(Hoeim et. al., SIGGRAPH, 2005)

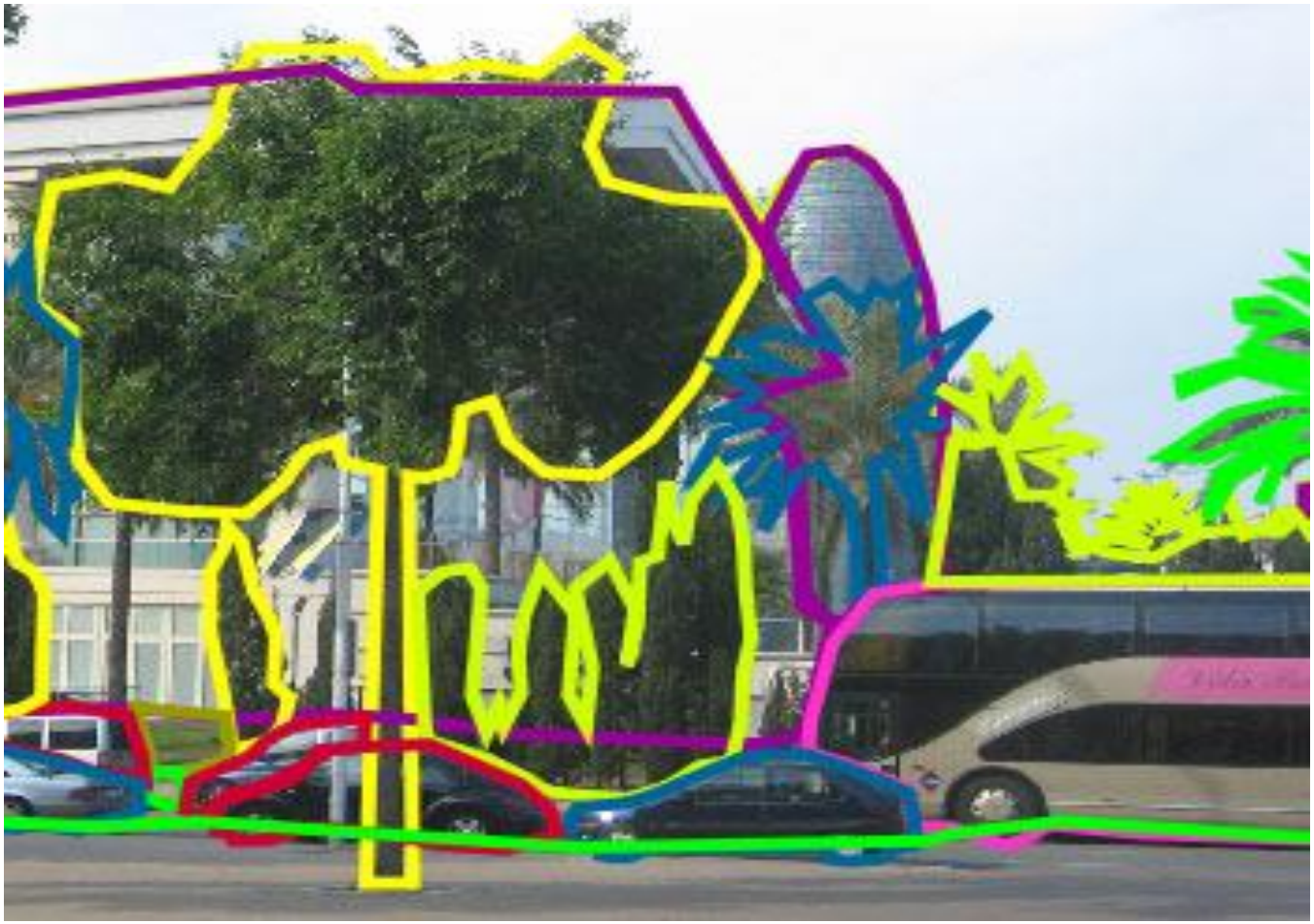


The Object Bank Representation



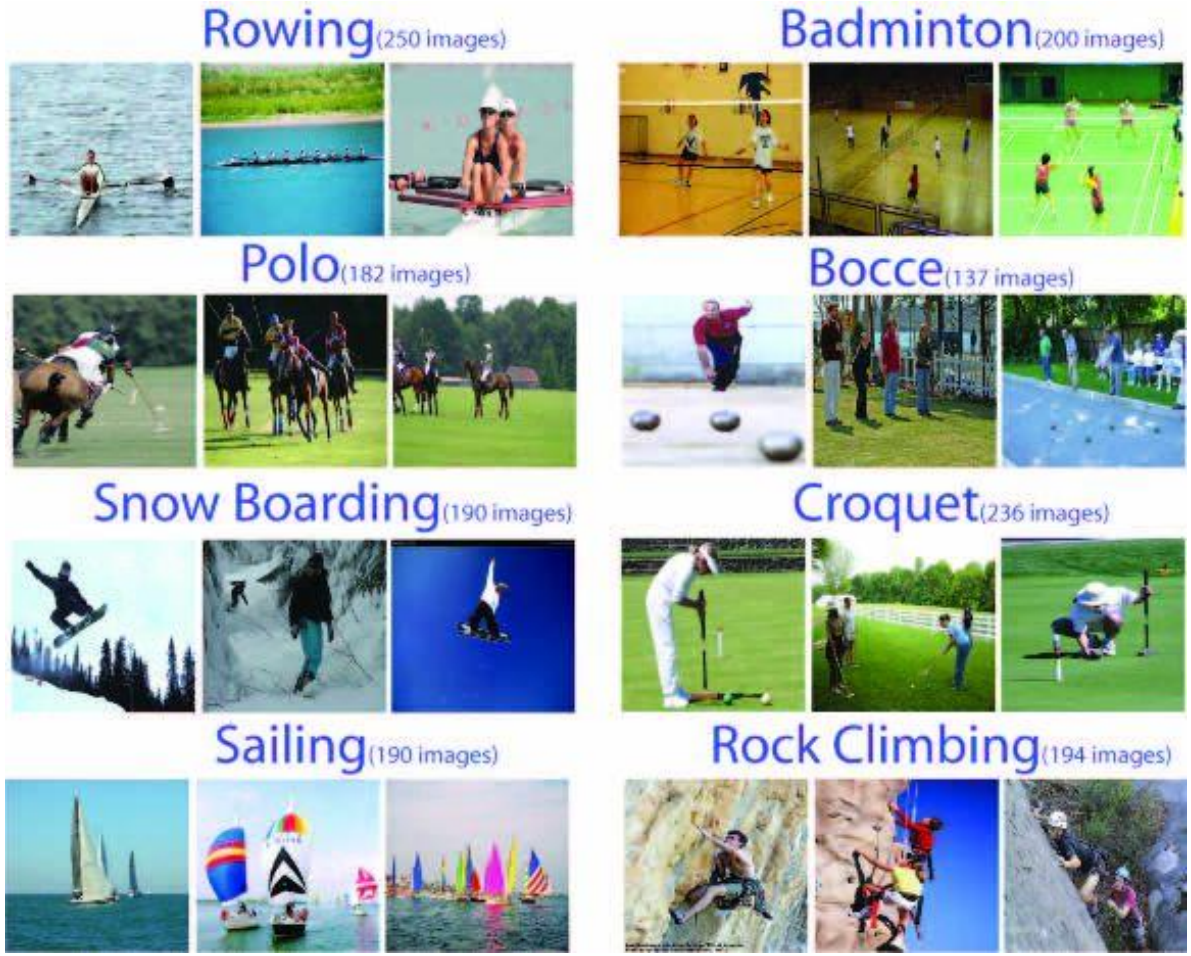
Dataset- 15-Scene
(Lazebnik et.al. CVPR, 2006)

Dataset- LabelMe
(Torralba et.al,MIT AI Lab Demo,2005)

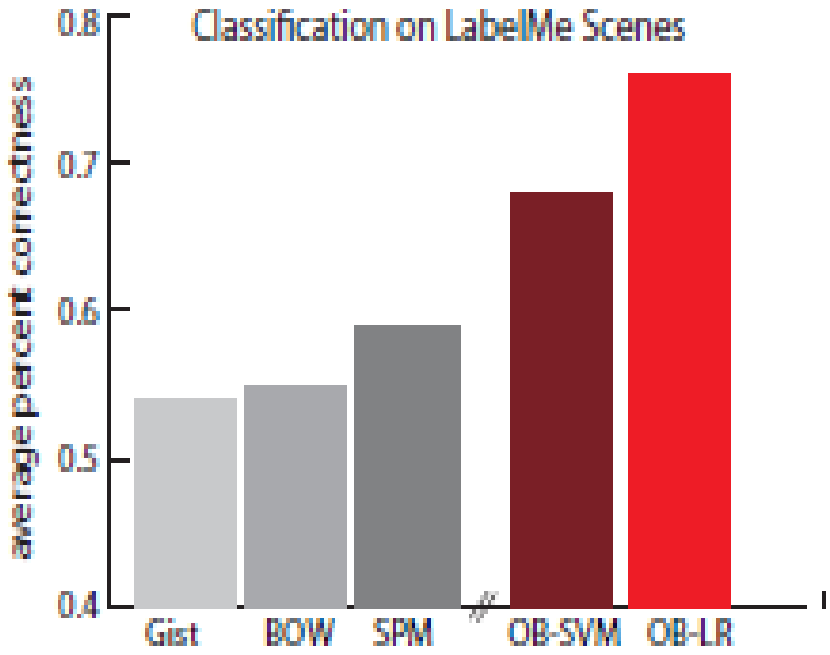


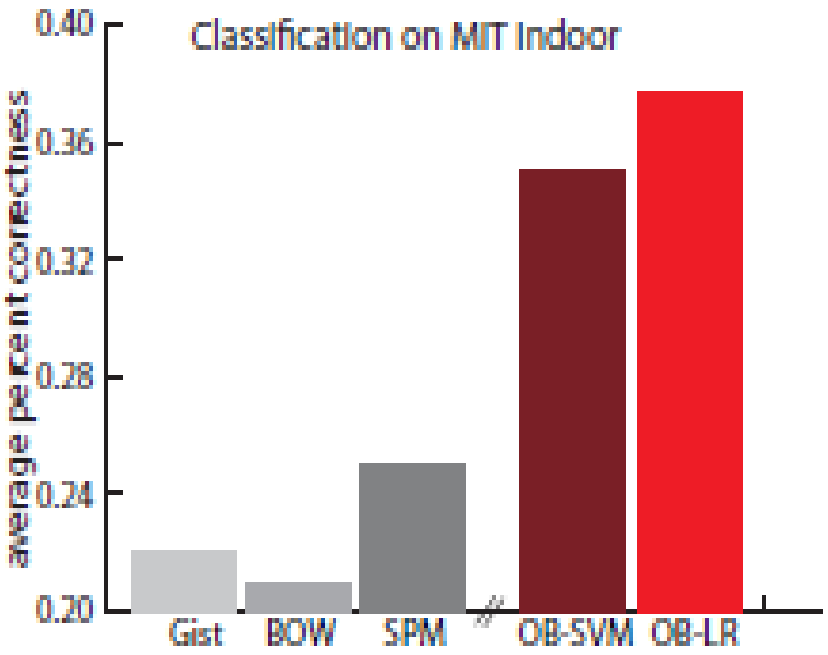
Dataset- MIT Indoor
(A.Torralba et.al., CVPR 2009)

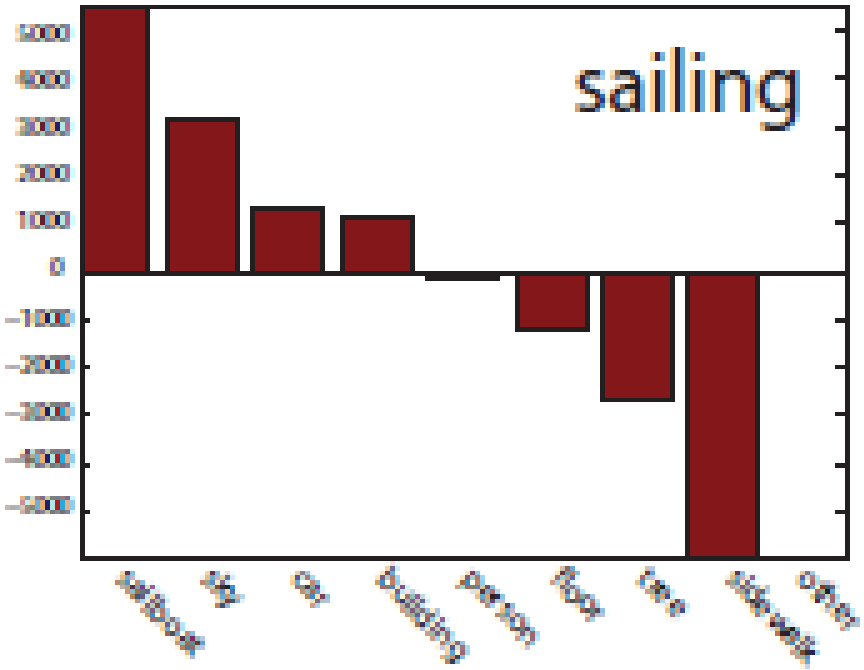
Dataset-UIUC Sports
(Li Fei-Fei et.al., ICCV 2007)

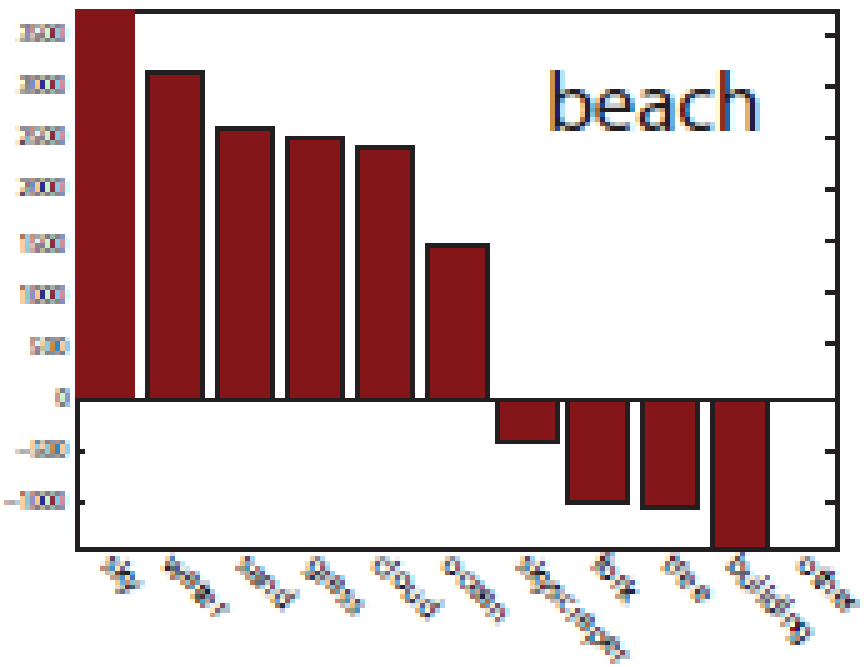


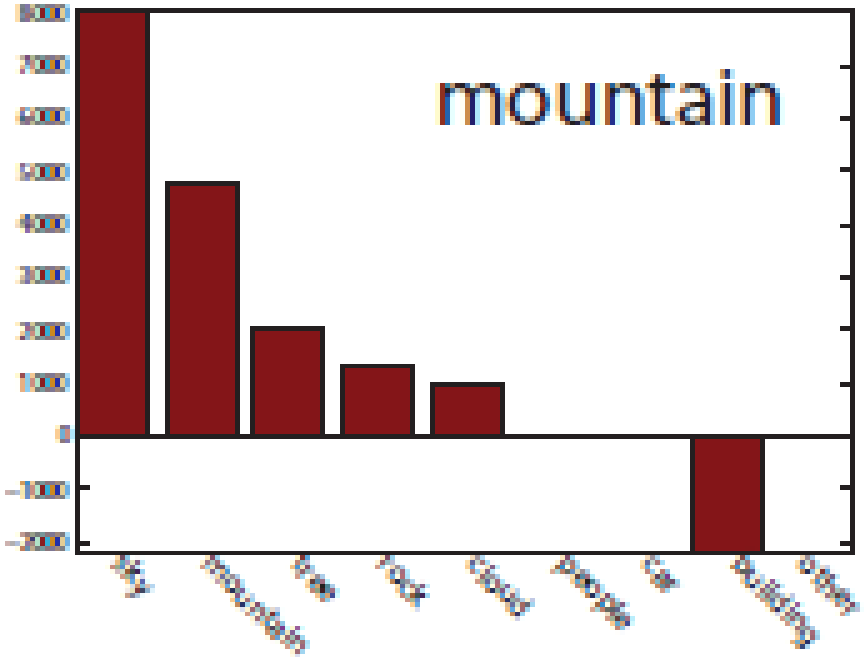
Results across different test datasets

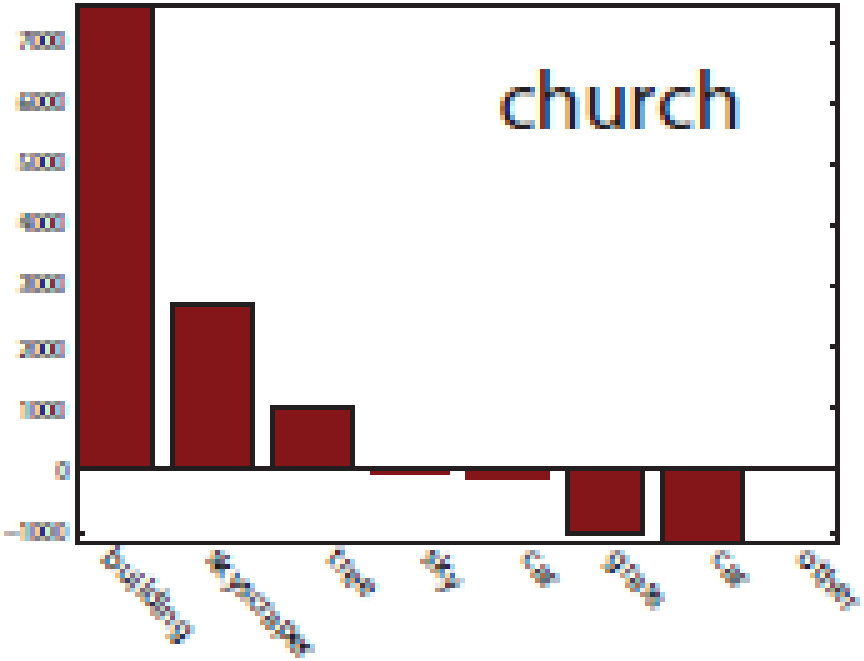


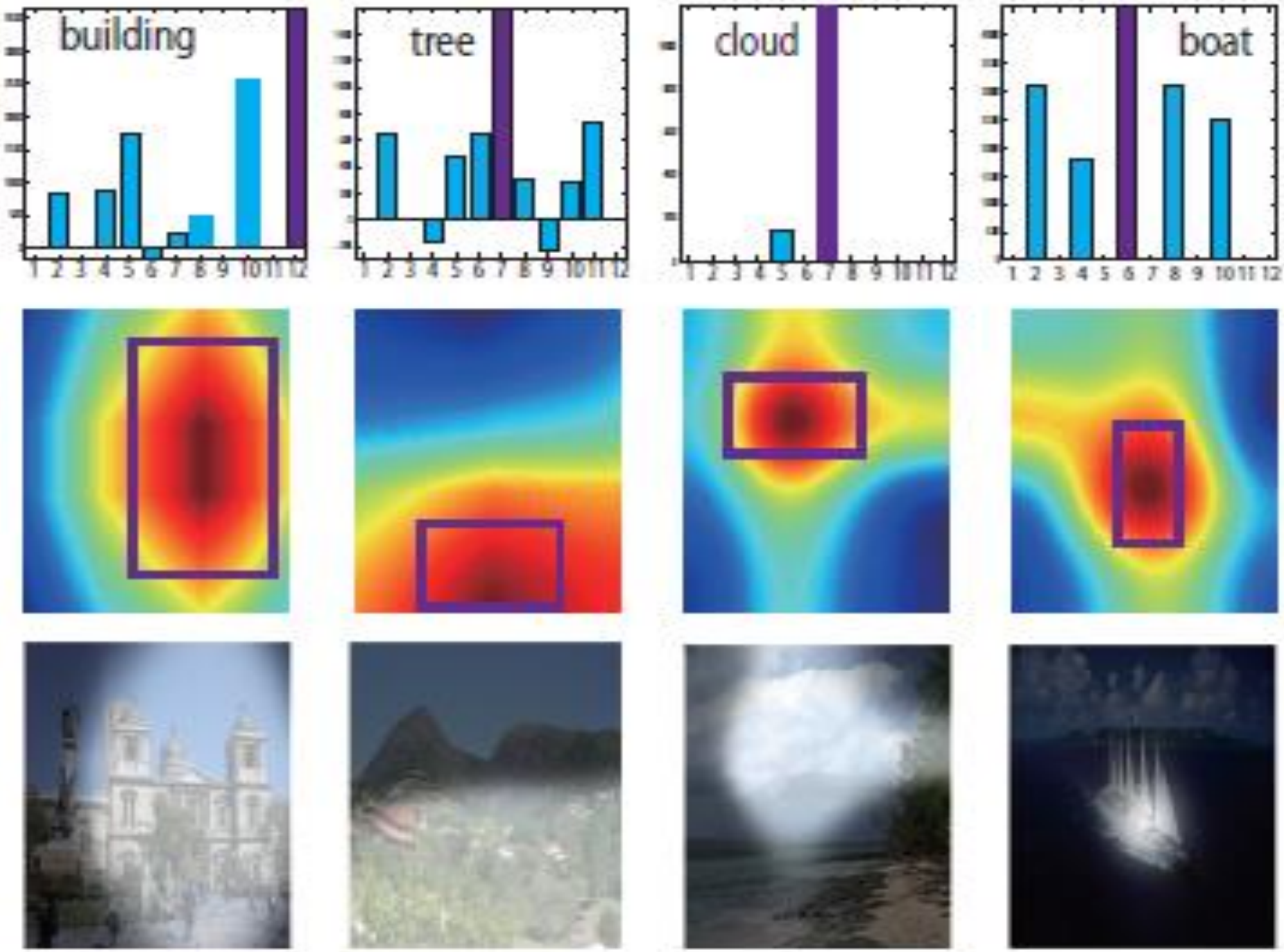



sailing
5000
4000
3000
2000
1000
0
−1000
−2000
−3000
−4000
−5000
sailboat
sky
car
building
person
boat
tree
sidewalk
other


beach
3500
3000
2500
2000
1500
1000
500
0
−500
−1000
sky
water
sand
grass
cloud
ocean
skyscraper
boat
tree
building
other


mountain
8000
7000
6000
5000
4000
3000
2000
1000
0
−1000
−2000
sky
mountain
grass
rock
cloud
people
car
building
other

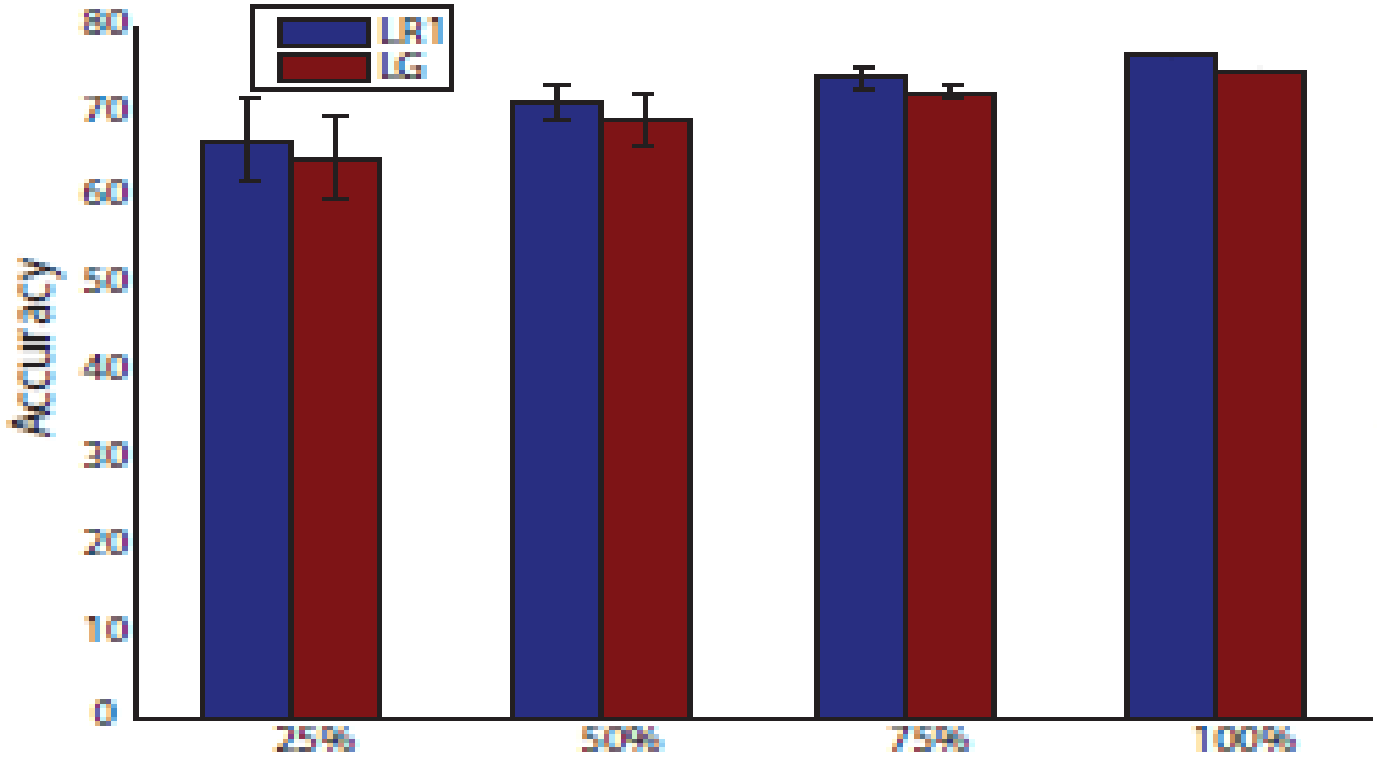

church
7000
6000
5000
4000
3000
2000
1000
0
−1000
building
skyscraper
tree
sky
car
grass
cars
other


building
tree
cloud
boat
1 2 3 4 5 6 7 8 9 10 11 12

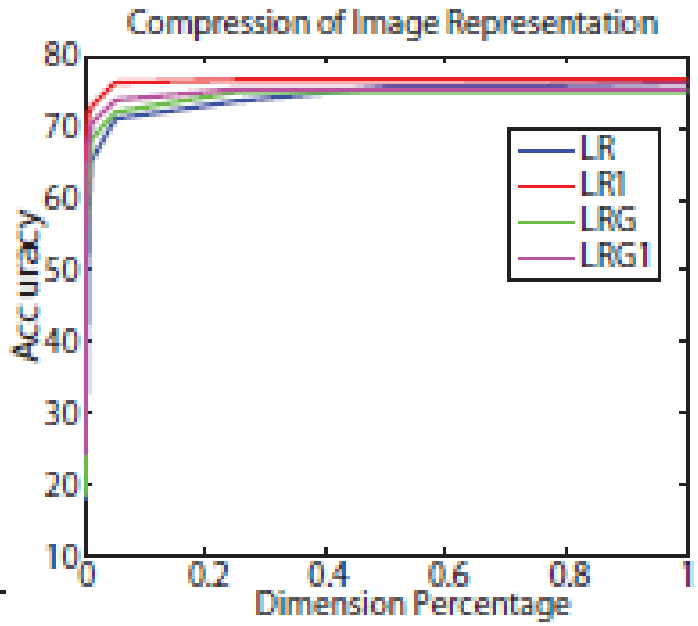
Discussions about OB

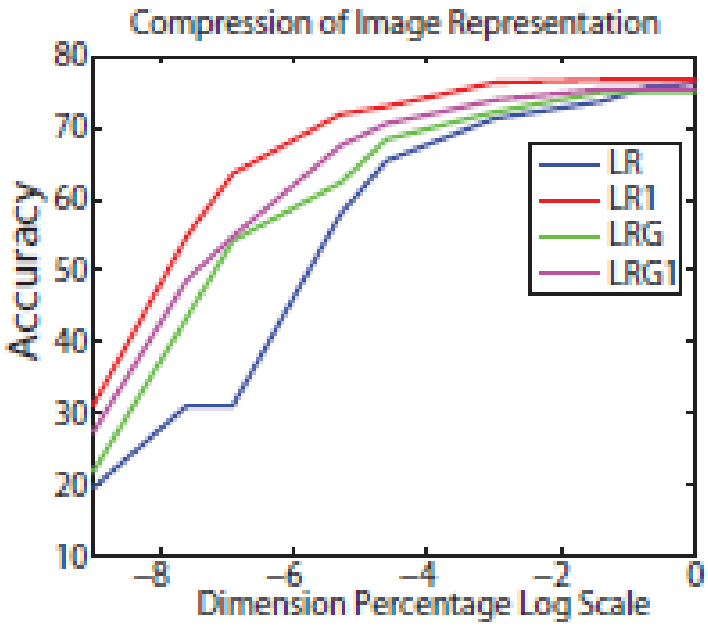
- Why 200 objects? Why not all?
- Robustness wrt Training Sample Size
- Near losslessness of Content Based Compression
- Profitability Over Growing OB

Robustness

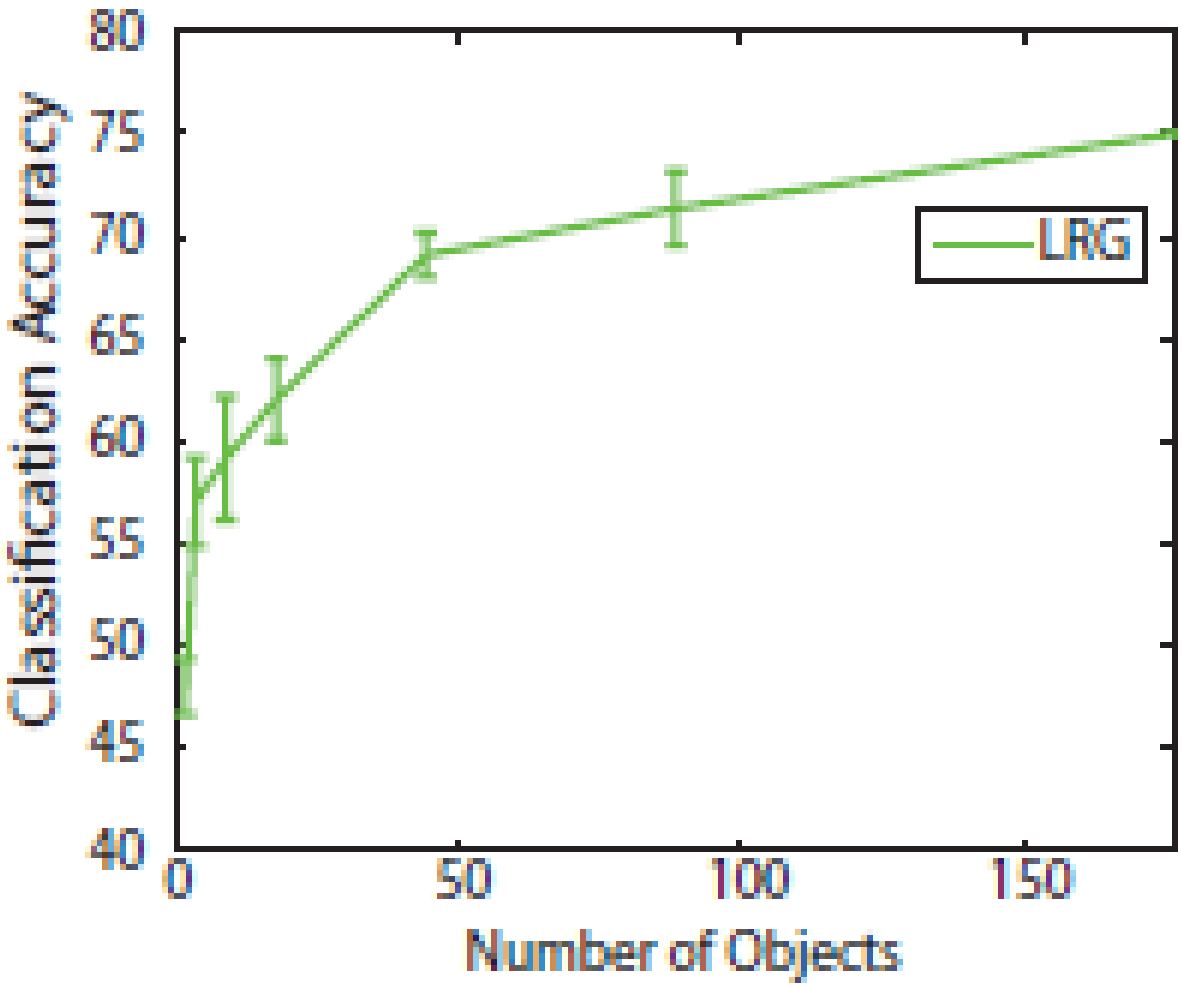


Near Losslessness of Content Based Compression





Profitability of Growing OB



To sum it up!

- Semantic meaning to scenes implies better categorization
- We need to take care of the humongous volume of visual data that we have and this work helps us move towards organization of that data
- It is the stuff for the future!