



The Vision Lab
Computer Science Dept.

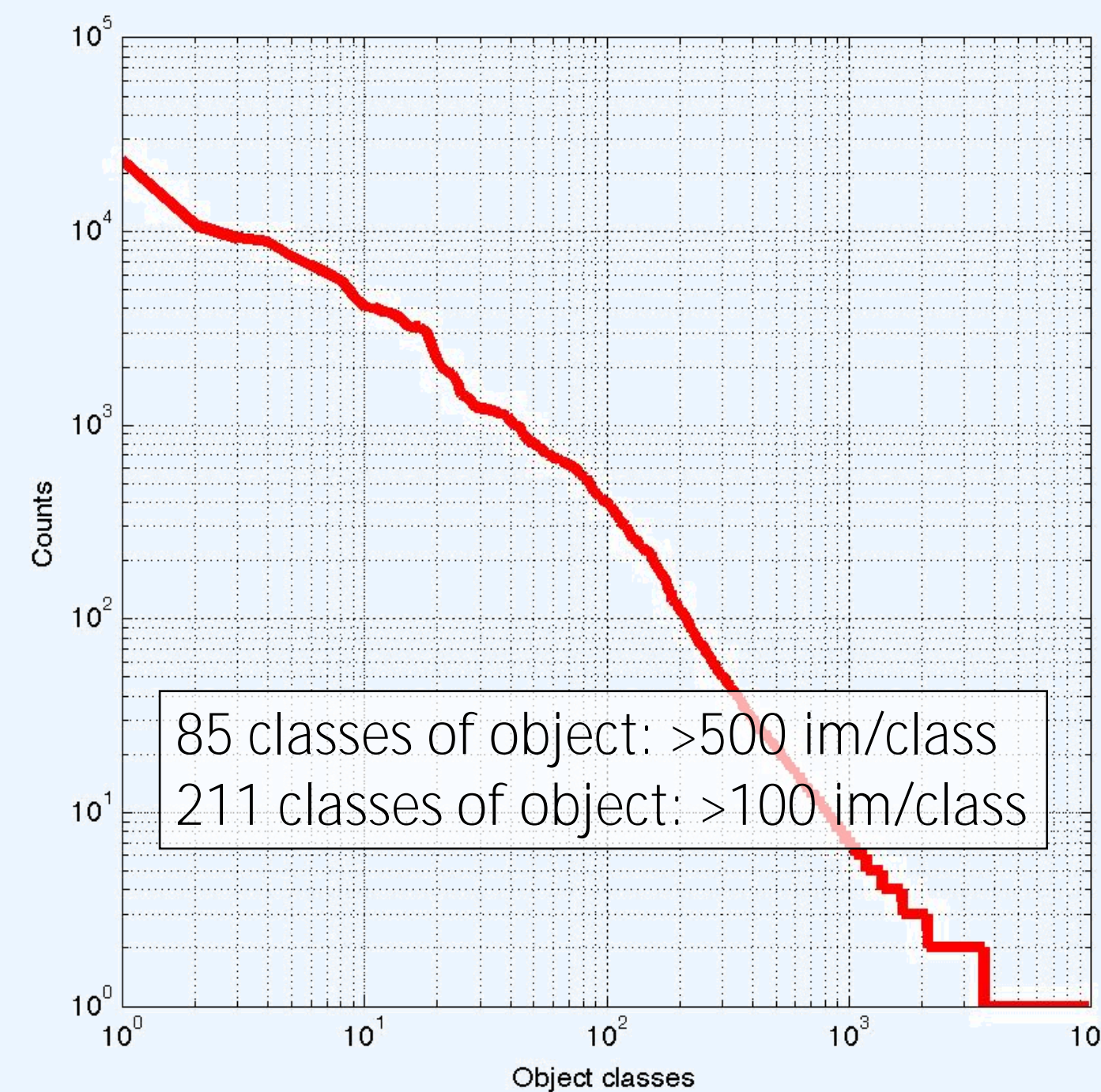
Novel Datasets for Fine-Grained Image Categorization

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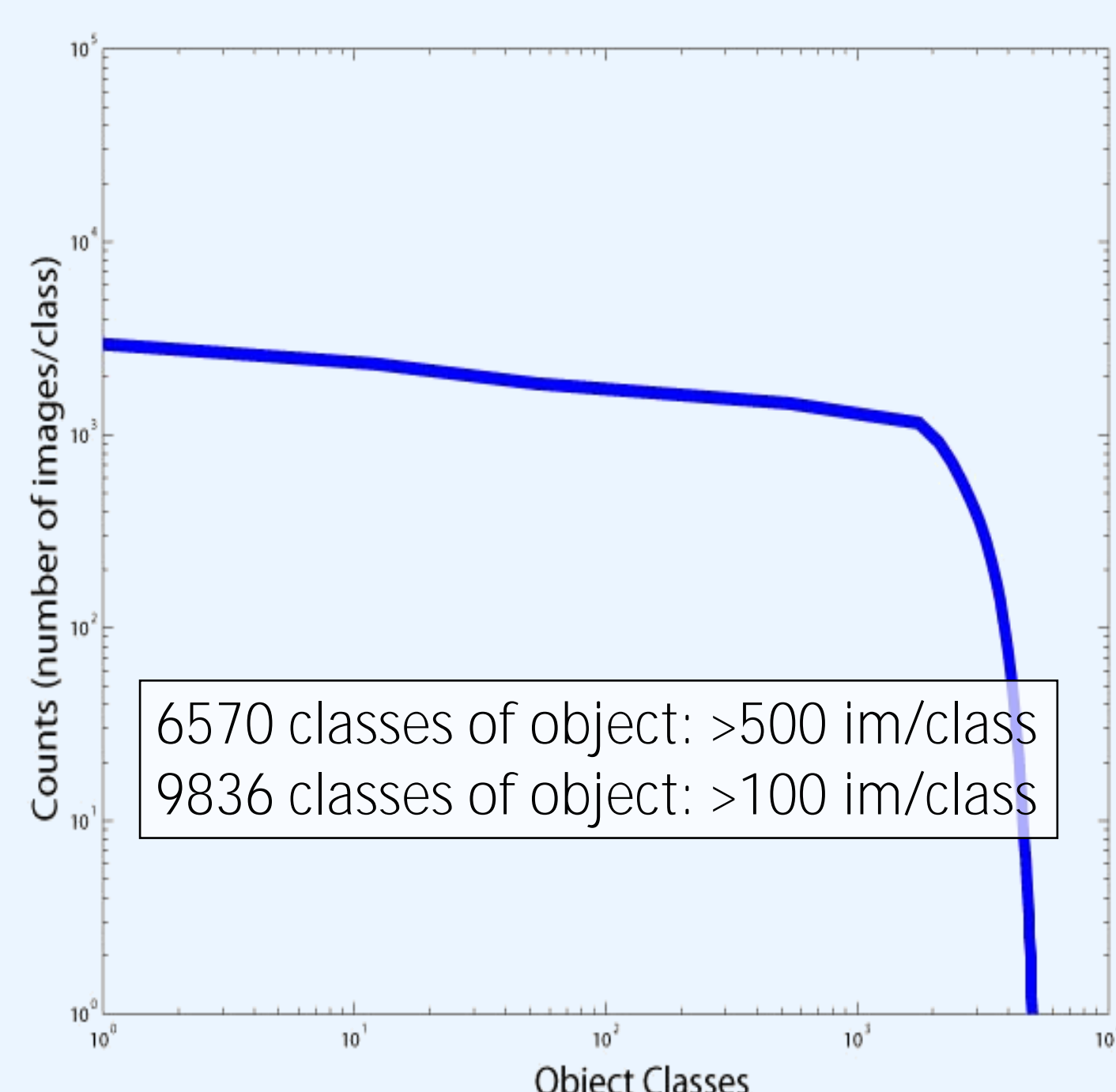


Stanford University

Motivation



LabelMe



IMAGENET

Our Work

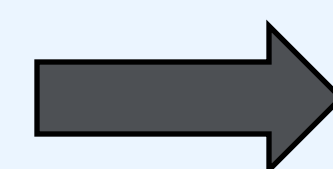
- Motivation: The hierarchical structure and image distribution of ImageNet make it a great resource for fine-grained image categorization datasets
- Our contributions:
 - Collected/cleaned and annotated a **novel dataset** addressing the drawbacks of existing datasets
 - Provide baseline results on the datasets that demonstrate their effectiveness

Details of Proposed Datasets

New Datasets	No. of Classes	No. of Images	Images per class	Training Images/class	Visibility varies?	Bounding boxes?
Dogs	120	~22000	~180	100	Yes	Yes

Previous Datasets	No. of Classes	No. of Images	Images per class	Training Images/class	Visibility varies?	Bounding boxes?
CUB-200	200	6033	30	15	Yes	Yes
PPMI	24	4800	200	100	No	Yes
PASCAL Action	9	1221	135	~60	Yes	Yes

- Our dataset significantly increases the number of images to allow algorithms to better capture the subtle differences between fine-grained classes

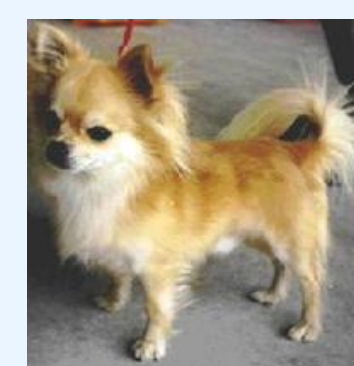


bounding boxes provided for all images

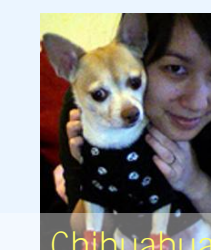
Experiments – ImageNet Dogs Dataset

Example Images

Reference image:
Chihuahua



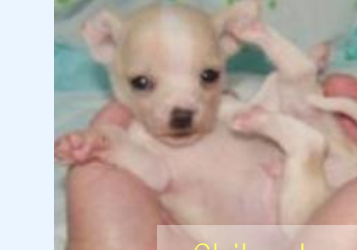
Different pose



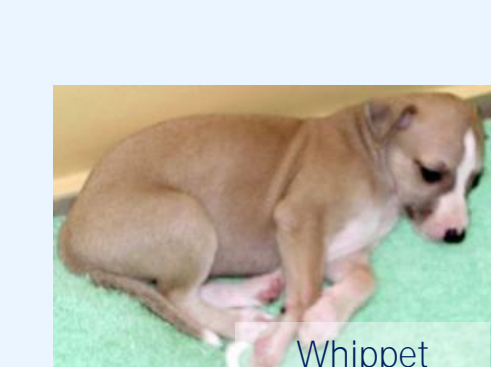
Partial Occlusion



Different Appearance



Different Age



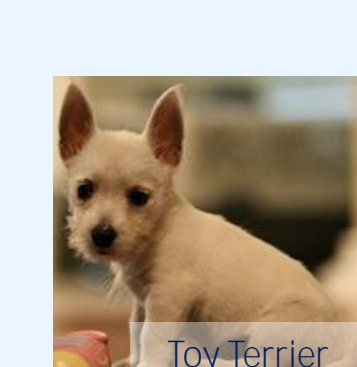
Whippet



Toy Terrier



West Highland Terrier



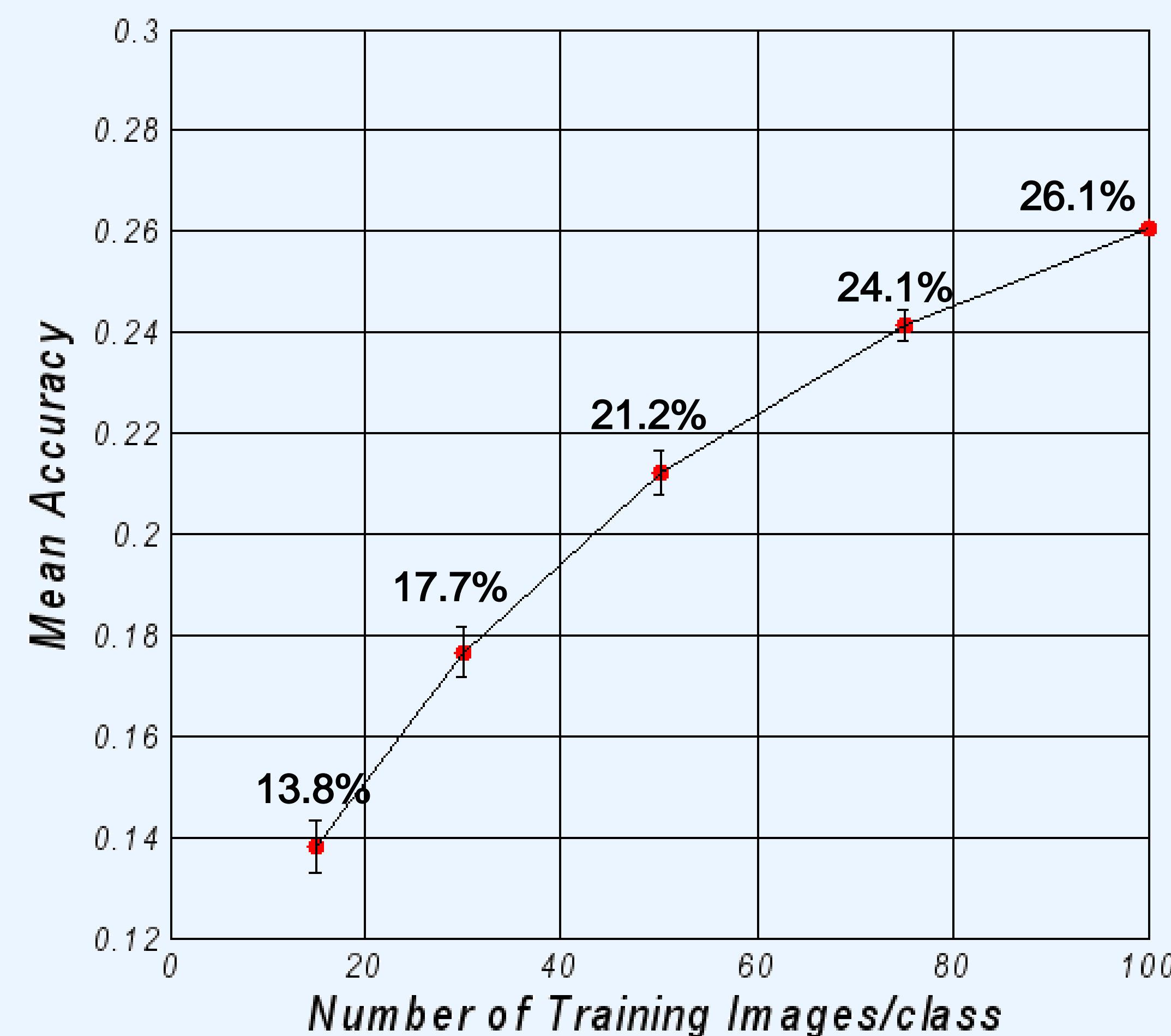
Toy Terrier

Different classes,
very similar appearance

Dataset Collection



Accuracy wrt Number of Training Examples

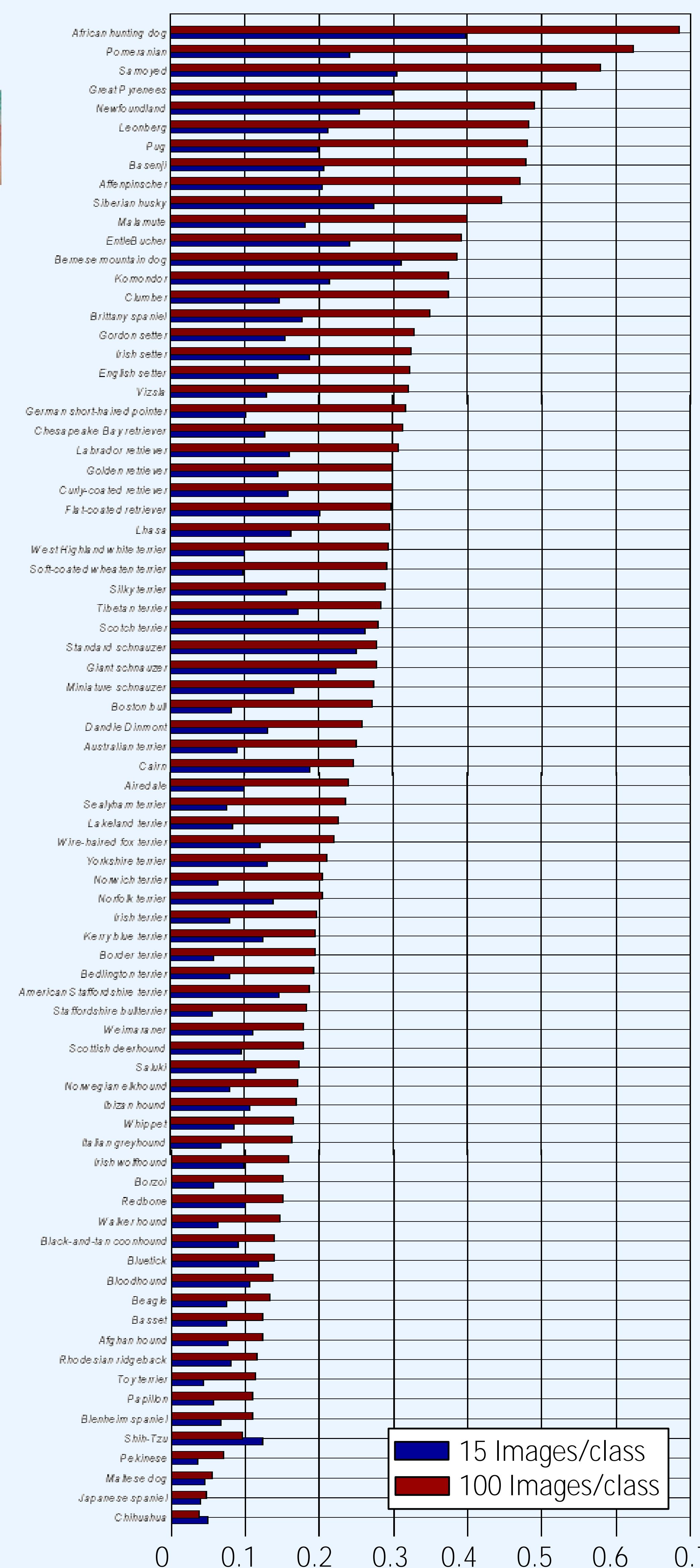


Note: Above results are on 70 of 120 classes as collection is in progress (check website for latest results)

Conclusions

- Fine-grained image categorization can greatly benefit from a large number of training examples
- The proposed datasets can adequately address the drawbacks in existing datasets

15 vs 100 Training Examples/Class



Reference

A. Khosla, N. Jayadevaprakash, B. Yao and L. Fei-Fei. "Novel Datasets for Fine-Grained Image Categorization." First Workshop on Fine-Grained Visual Categorization, CVPR 2011.