Problem and Contributions

• Fine grained categorization of dog breeds
• Create a new dataset covering 133 dog breeds
• Apply part detection to object classification
• Infer class-specific object parts to improve classification
• Design a free iPhone app for dog breed identification

Dog Breed Dataset

• 133 American Kennel Club (AKC) recognized dog breeds
• 8,351 real-world images of dogs
• 66,808 part labels (Eight per image)

Example Breeds

Example Part Labels

Pipeline

• Face detection (a) and Fiducial localization (b)
• Feature extraction at detected and inferred fiducials (c, d)
• Breed classification using the facial features (e)

Dog Face Detection

• Our classification algorithm focuses on the face of the dog
• The face is largely rigid, and contains much of the identity information
• The face detector is a SVM regressor with greyscale SIFT as features
• The SIFT descriptors are extracted at fixed positions and scales
• The sliding window detector scans the image over scale and rotation

Face Part Localization

• Build on the consensus of models approach for the generic parts
• Combine low-level detectors with shape model of part locations
• The local detector is a sliding window SVM with SIFT over scales

Breed Classification

• Train one vs. all SVMs for each breed
• Two types of features: greyscale SIFT and color histogram
• SIFT features are extracted at places dictated by the part locations
• Breed-specific parts are inferred from exemplars during training & testing

iPhone App: DogSnap

Our method achieves 67% classification rate, demonstrating the importance of part correspondence. Also, part detection assists in improving face detection, thus benefitting the whole system.