Object Instance Sharing by Enhanced Bounding Box Correspondence

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4 bicycles, no correspondence
4 bicycles with correspondence

Basic Idea: Our approach brings objects instances into correspondence. This allows an instance to be reused multiple times for training object models.

Mixture Models for tackling Intra-Category Diversity
Cluster data, and train separate classifier per subcategory

Performance saturates as #subcategories increase: reduce diversity but very little data per subcategory [2]

Performance saturates

Idea: Share an Instance across Multiple Subcategories
Subcategories: Share an Instance across Multiple Subcategories

Mixture Models

Top Detections

[1] uses best

[2] uses all

Latent SVM in [1]
(uses max scoring detection, above 70% overlap)

Proposed Formulation
(uses all detections, above 15% overlap)

\[ \min_{\beta} \frac{1}{2} \sum_{k=1}^{K} \left[ \sum_{i=1}^{n} ||w_k||^2 + C_1 \sum_{i=1}^{n} \sum_{k=1}^{K} \beta_{i,k} e_{i,k} + C_2 \sum_{i=1}^{n} \left( 1 - e_{i,k} \right) \right] \]

\[ s_{i,k} = w_k^T \phi(x_i) + b_k, 0 \leq \beta_{i,k} \leq 1 \]

- \( \beta_{i,k} \) measures contribution of instance \( i \) towards subcategory \( k \)
- Solved using alternative minimization
- Initialize \( \beta \) using solution of [1]

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