Weakly Supervised Object Boundaries

Motivation
- **Goal:** High quality object boundaries from bounding box annotations.

Framework
- **Full supervision:** Significant annotation effort is required.
- **Weak supervision:** Bounding box annotation requires 2 clicks per object.

Boundary detection tasks:
- **Generic boundaries:** BSDS, COCO, SBD
- **Object-specific boundaries:** VOC, SBD

Levels of supervision:
- **Fully unsupervised:** Detection annotations
- **Detection and generic boundary annotations:** Ground truth

Baseline methods:
- **SE:** Structured Edge Forests [Dollar et al., PAMI’15]
- **HED:** Holistically-nested Edge Detection [Xie et al., ICCV’11]

Robustness to Annotation Noise
- **BDS:** generic boundaries
- **SE** and HED are robust to annotation noise during training.

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Approach: Generate weakly supervised annotations to train boundary detector.

Combination of sources:
- Detection bounding boxes
- Graph-based segmentation
- Box driven segmentations
- Object proposals

Generated annotations:
- **F&H \& BB:** Detection bounding boxes
- **SeSe \& BB:** Graph-based segmentation
- **SeSe \& BB:** Box driven segmentations
- **SeSe \& BB:** Object proposals

Experimental Results

VOC: object-specific boundaries

SBD: class-specific object boundaries

While training an object detector one can also get high quality object boundary detector for free!