

Hierarchical Scene Annotation

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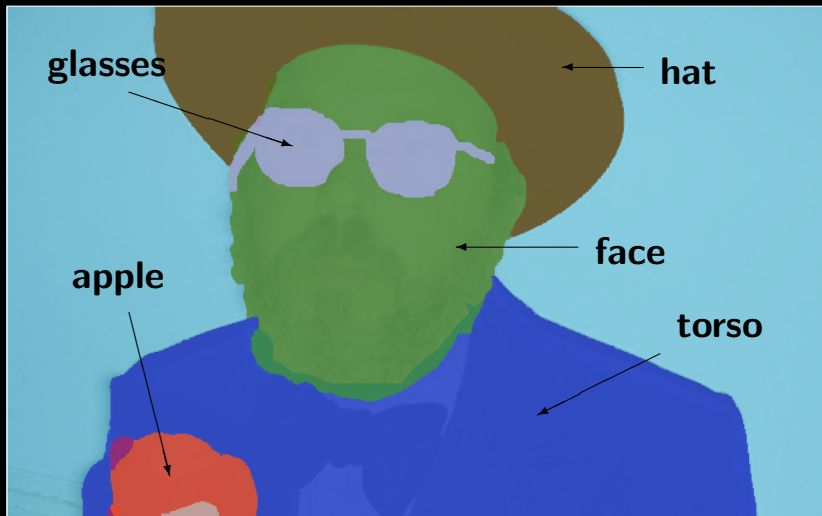
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²University of California at Berkeley / ICSI - Berkeley, CA

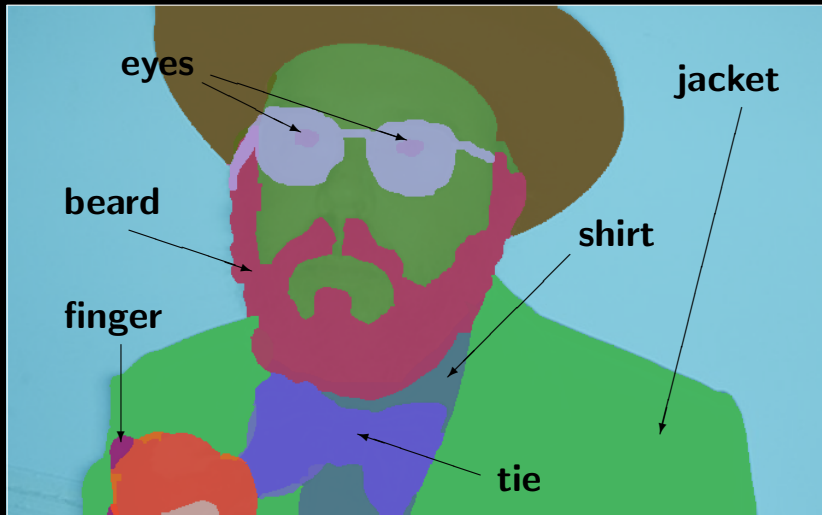
What to Annotate?



Objects/Parts



Subparts



Figure/Ground



Rich Annotation

Rich Annotation

- ▶ Multiple modalities:
 - ▶ Objects, parts, subparts
 - ▶ Object-part containment
 - ▶ Segmentation
 - ▶ Occlusion (figure/ground)
 - ▶ Attributes

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BMVC
2013

extension

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- ▶ Unifying abstraction: region trees

BMVC
2013

extension

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- ▶ Unifying abstraction: **region trees**
- ▶ Web-based annotation tool
 - ▶ Computer-assisted segmentation
 - ▶ Model invariant enforcement
 - ▶ Visual feedback
 - ▶ “LabelMe on steroids”

BMVC
2013

extension

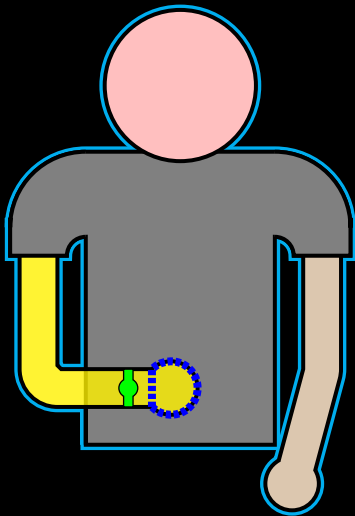
Rich Annotation

- ▶ Multiple modalities:
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 - ▶ Object-part containment
 - ▶ Segmentation
 - ▶ Occlusion (figure/ground)
 - ▶ Attributes
- ▶ Unifying abstraction: **region trees**
- ▶ Web-based annotation tool
 - ▶ Computer-assisted segmentation
 - ▶ Model invariant enforcement
 - ▶ Visual feedback
 - ▶ “LabelMe on steroids”
- ▶ Object segmentation dataset + benchmark

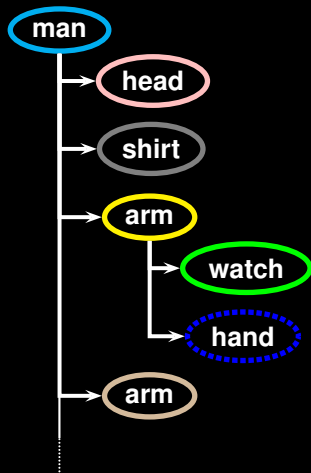
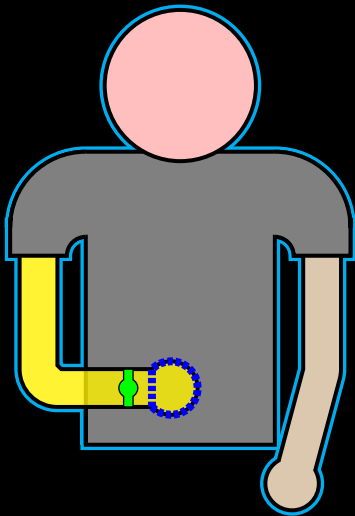
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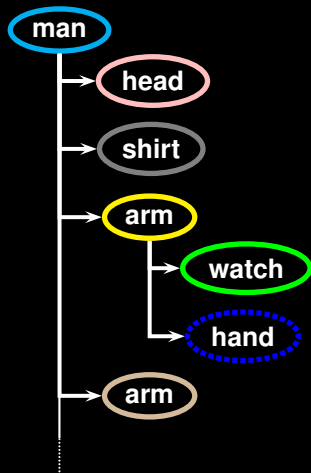
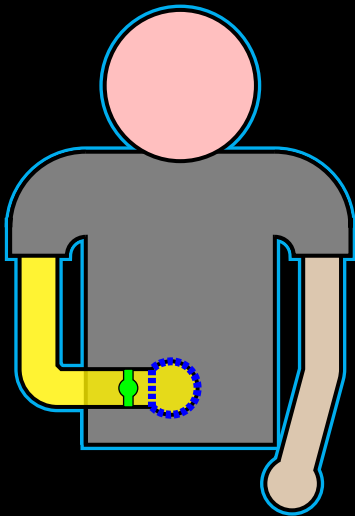
Object Model: Region Tree



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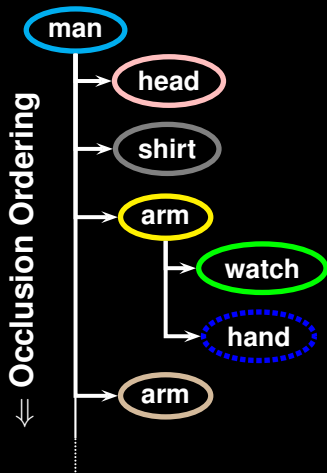
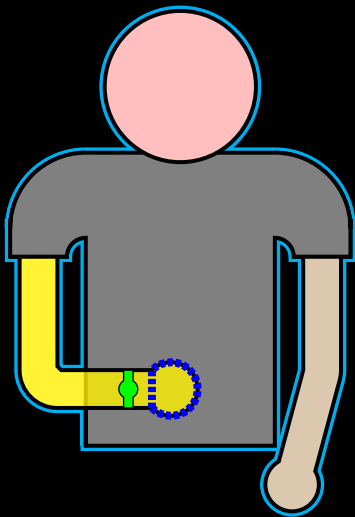


Object Model: Region Tree

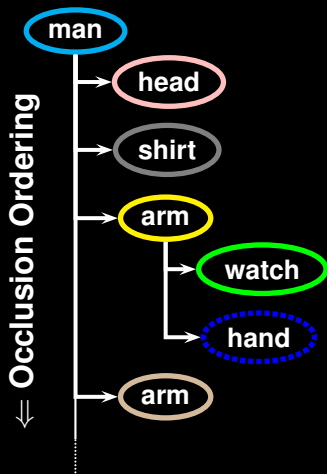
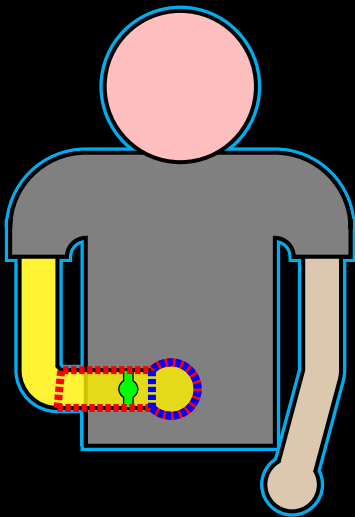


Object-Part $\Rightarrow$

Object Model: Region Tree

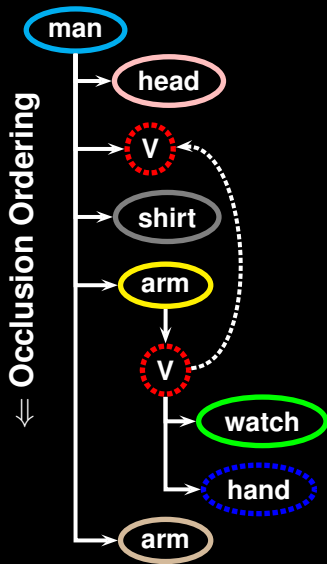
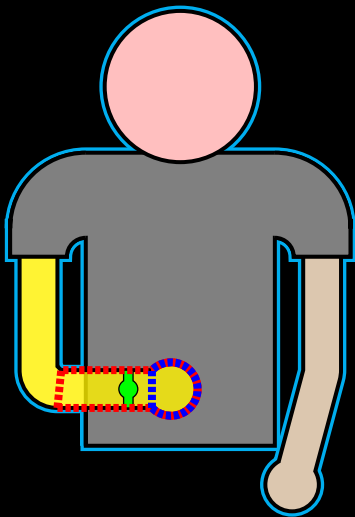


Object Model: Self Occlusion

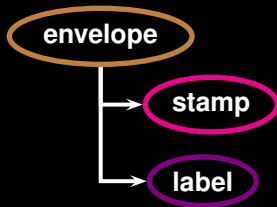
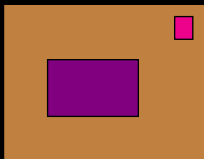


Object-Part $\Rightarrow$

Object Model: Virtual Link

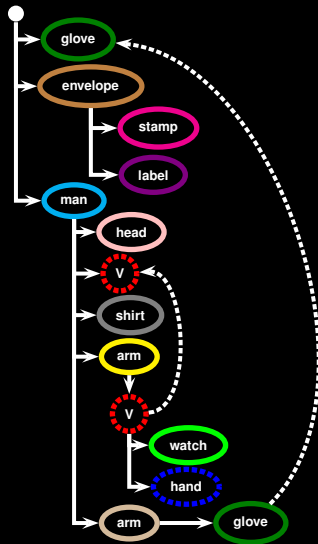
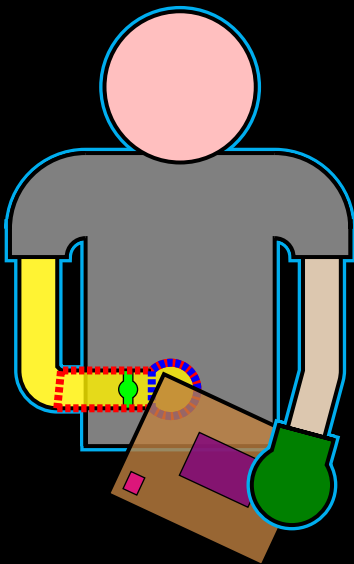


Additional Object Models

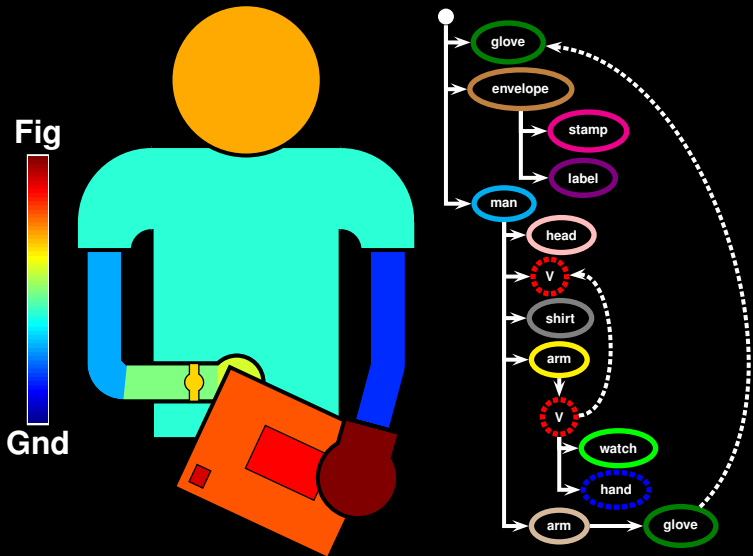


Scene Model: Region Tree

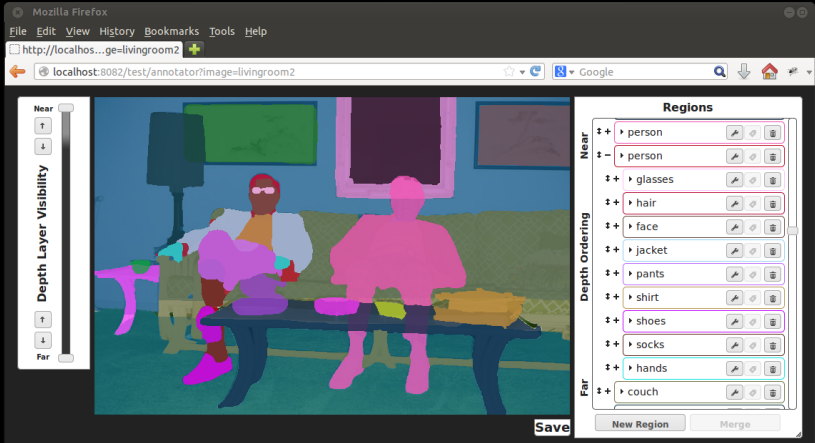
Objects/Parts



Tree Traversal Recovers Figure/Ground



Annotation Software



Region Tree Navigation



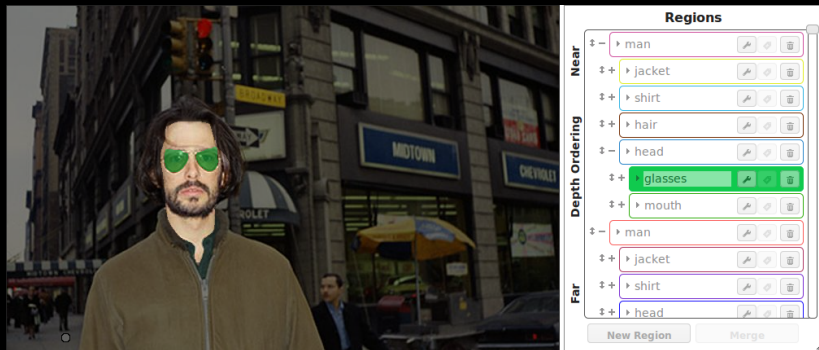
Region Tree Navigation



Containment Constraints



Containment Constraints



Interactive Segmentation



Image



Oversegmentation



Click

Interactive Segmentation



Image



Oversegmentation



Drag

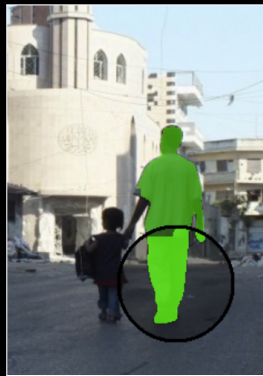
Interactive Segmentation



Image



Oversegmentation



Release

Interactive Segmentation



Image

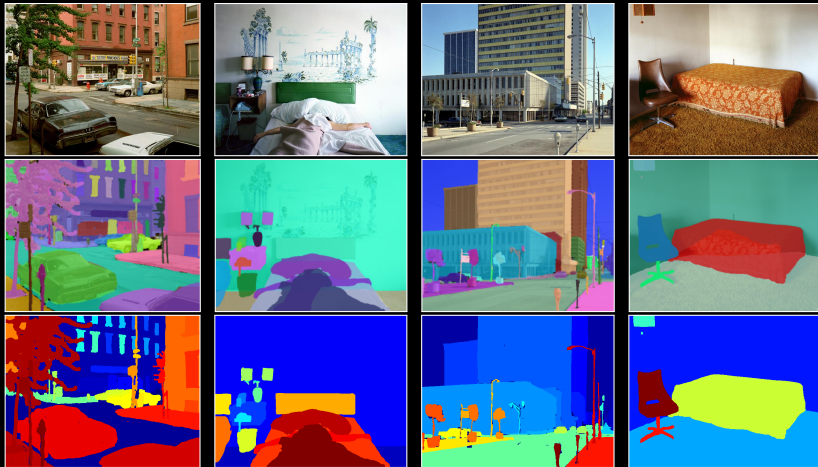


Oversegmentation



Touch-up

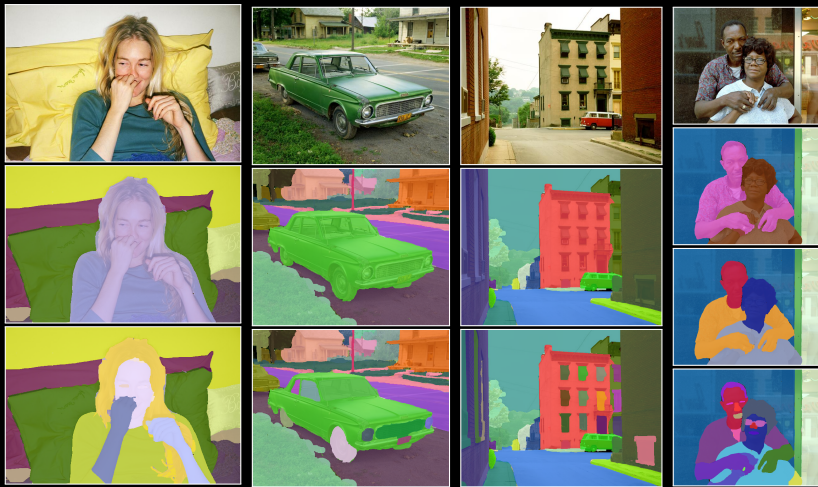
Annotated Scene Dataset



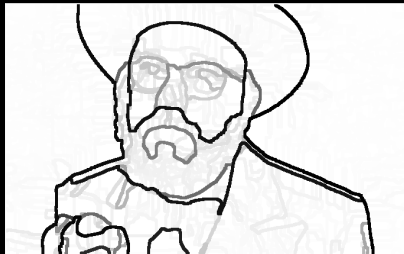
Annotated Scene Dataset



Example Object-Part Hierarchies



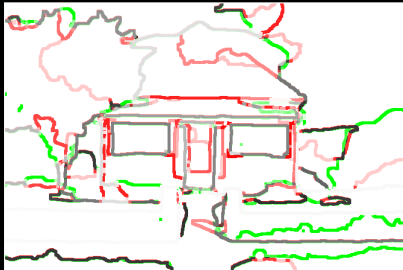
Groundtruth UCM vs gPb-UCM



Groundtruth UCM vs gPb-UCM



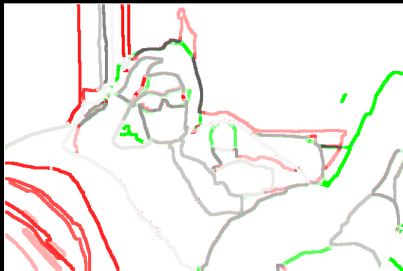
Groundtruth UCM vs gPb-UCM



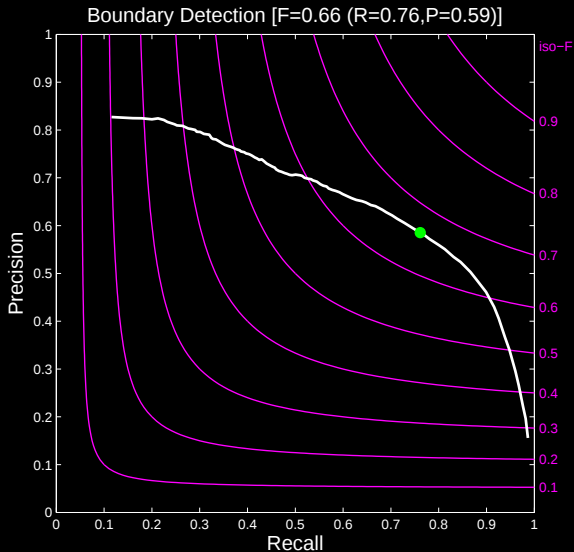
Groundtruth UCM vs gPb-UCM



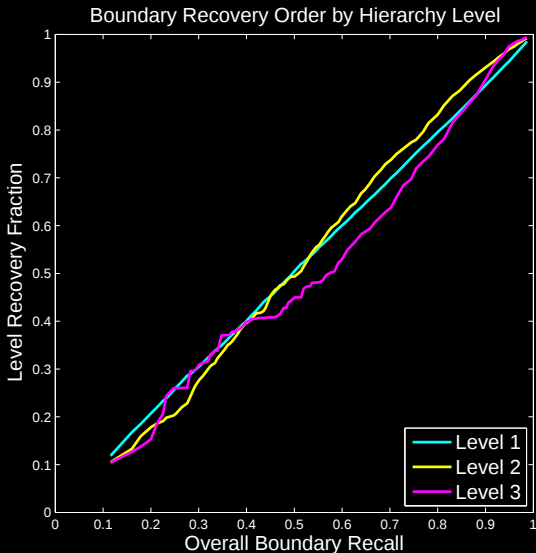
Groundtruth UCM vs gPb-UCM



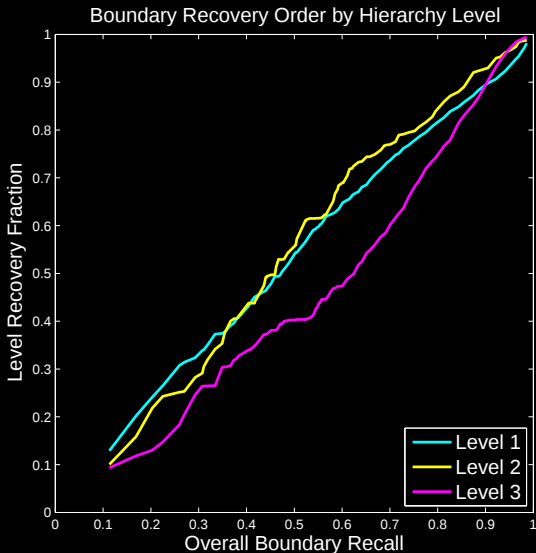
Boundary Benchmark



Hierarchical Boundary Benchmark



Hierarchical Boundary Benchmark - Portraits



Thank You