Weakly Supervised Semantic Segmentation

Goutam YG, Haris Iqbal, Marimuthu Kalimuthu

Department of Computer Science
Saarland University

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Problem Statement

- Segmenting an image using scribbles as partial labellings
- Challenging because of: ill-defined boundaries, articulations, noise etc.,

Motivation

- Obtaining dense segmentation results manually is both costly and time-consuming.
- Unsupervised approaches do not yield good results in general
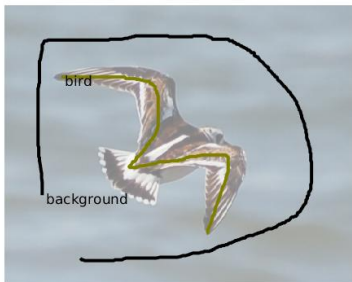- With scribble annotations, it is possible to achieve high accurate results

Figure: Scribble Annotated

Related Works

- Dilation Network (Yu et al., 2016)
- ScribbleSup (Lin et al., 2016)
- SegNet (Kendall et al., 2015)
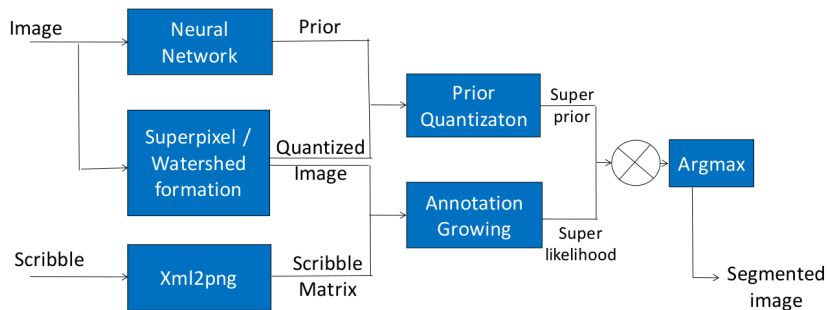- FCNs (Long et al., 2015)

Figure: Architecture of our System
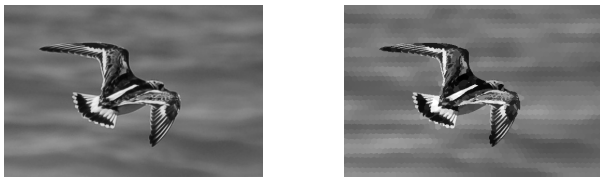
Visualization

Figure: Superpixel Visualization

Figure: Visualization of Likelihood using RGB histogram

Figure: Visualization of Likelihood based on distance from scribble

Visualization

Figure: Visualization of Max. Likelihood Estimation

- This result is obtained by max-likelihood estimation of how each superpixel is close to scribble in terms of rgb histogram and distance from scribble.

Experiments

- **DATASET: Pascal VOC-2012**
  - 20 classes segmentation
  - scribble annotation available

- "Dilation" Network built with Caffe.
  Training: Pascal-VOC-2012 training data.

- Testing: 100 images from Pascal-VOC-2012 cross-validation set

Experiment

- **Evaluation Metric**

$$\text{True positive rate } = \frac{\text{True positives}(\text{excl background})}{\text{All positives}(\text{excl background})}$$

RESULTS

Mean Accuracy prior(Baseline) = 85.13
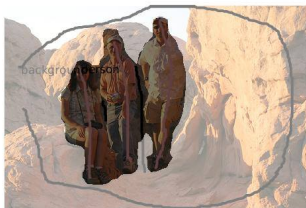Mean Accuracy posterior(Ours) = 86.43

Visual Comparison

prior

posterior

Figure: Baseline(left) vs Ours(right)

Figure: Baseline(left) vs Ours(right)

Conclusion

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- Also, we can improve label propagation methods from the scribbles.

Thank You!!