Propose and Re-rank Semantic Segmentation via Deep Image Classification
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Motivation
- Classification: Abundant annotation, Tractable models
- Semantic Segmentation: Less annotation, Intractable models

Propose and Re-rank

- Bridging classification and semantic segmentation
- Study how improvements in classification benefit semantic segmentation

Two-stage Propose and Re-rank Semantic Segmentation

- Original Image 100
- Propose CPMC
- Re-rank O2P
- Propose DivMBest
- Re-rank SSVM

State-of-the-art on PASCAL VOC Segmentation

- Method: VOC '12 comp6 test (%)
- Re-ranking [Yadollahpour et al. CVPR '13] 48.1
- Fisher Codemaps [Li et al. ICCV '13] 48.3
- CPMC-DeCAF [Girshick et al. CVPR '14] 47.9
- Ours 50.6

New state-of-the-art by 2.3%
- DeCAF [Donahue et al. arXiv '13] + RBF SVM for image classifiers of presence and size
- Combination with other features from [Yadollahpour et al. CVPR '13]

Propose and re-rank for semantic segmentation
- Deep Image classification as features for re-ranking
- Simple and effective!

Deep Image Classification as Features

- Consistency between segmentation and classification as features
  \[ \psi_{\text{chair}}(x, y) = s_{\text{chair}} \cdot l_{\text{chair}} \]
  - Classifier score: \( s_{\text{chair}} \)
  - \( l_{\text{chair}} = \begin{cases} \{-1\} & \text{No}_\text{chair} \\ \{0\} & \text{Has}_\text{chair} \end{cases} \)

- Presence and size classification
  - Presence: class exist
  - Size: class covering more than x% of the entire image

- Re-ranking with classification features using Structured SVM (SSVM)
  (Yadollahpour et al. CVPR '13)

Significant Potential Ahead

- Classification is crucial to semantic segmentation
- 48.1 → 58.7 from current to perfect classifiers