



Image Segmentation using Contour, Surface, and Depth Cues

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Motivation

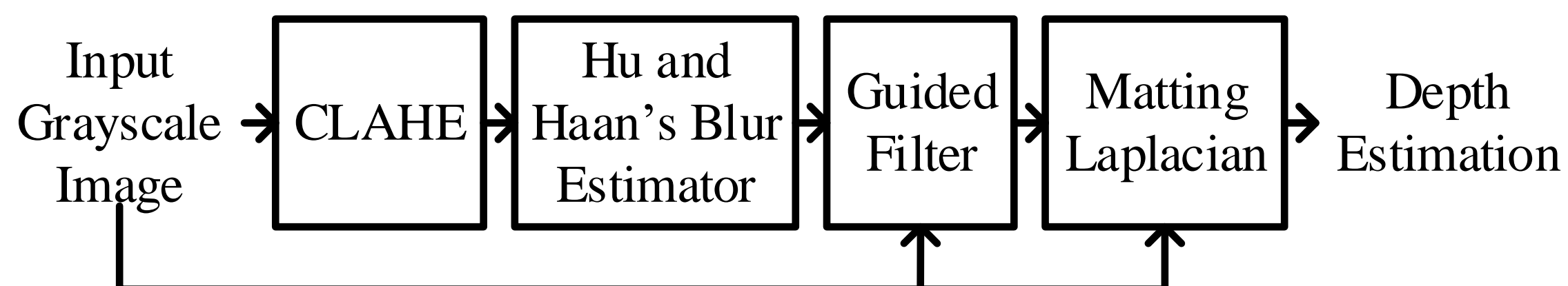
Automatic Image Segmentation

- Unsupervised learning - clustering
- Semantic approximation (object-level)
- Using low-level features (bottom-up)

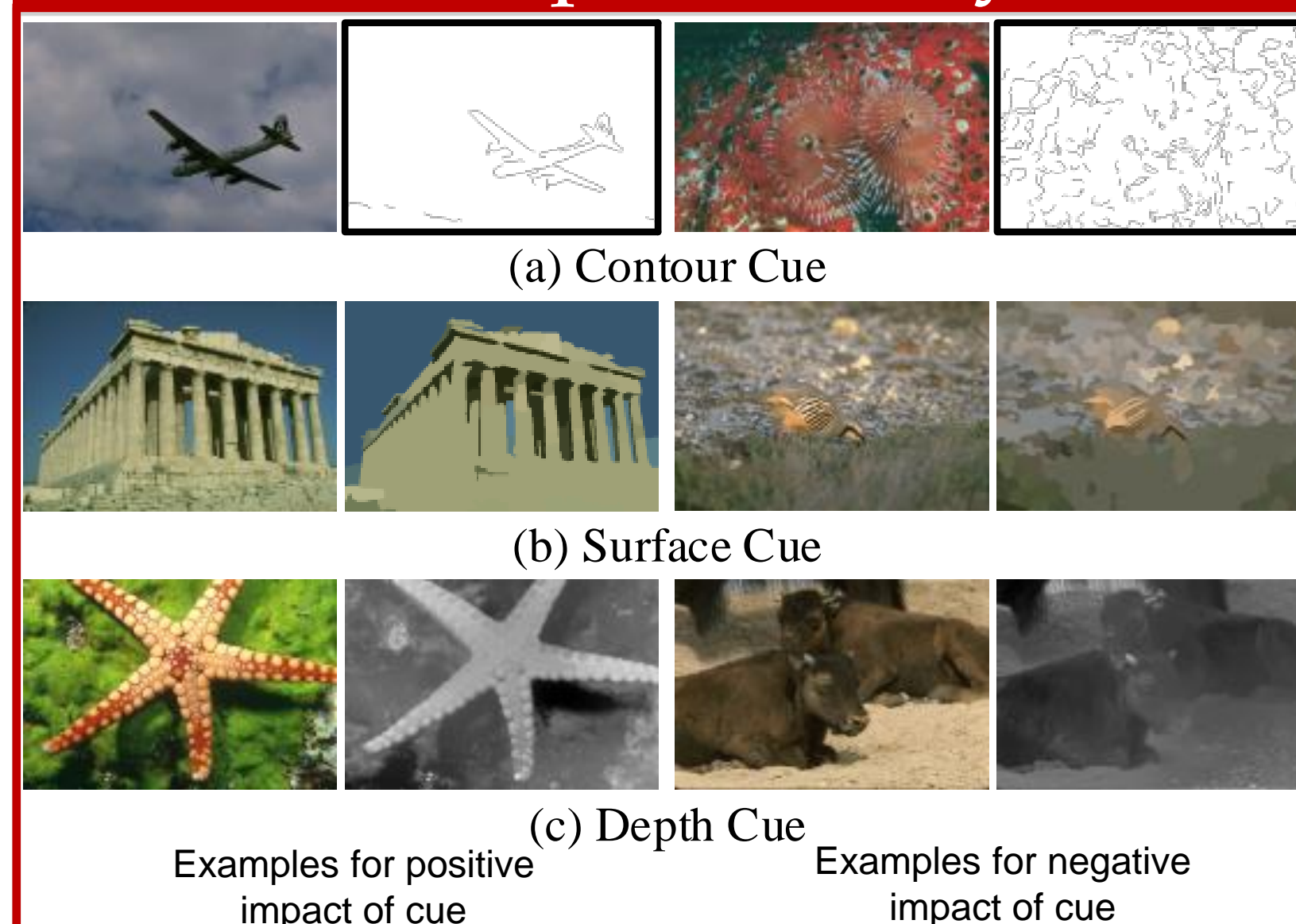
Challenges

- Leakage
- Over-segmentation
- Diverse ground truths

Proposed Depth Estimation

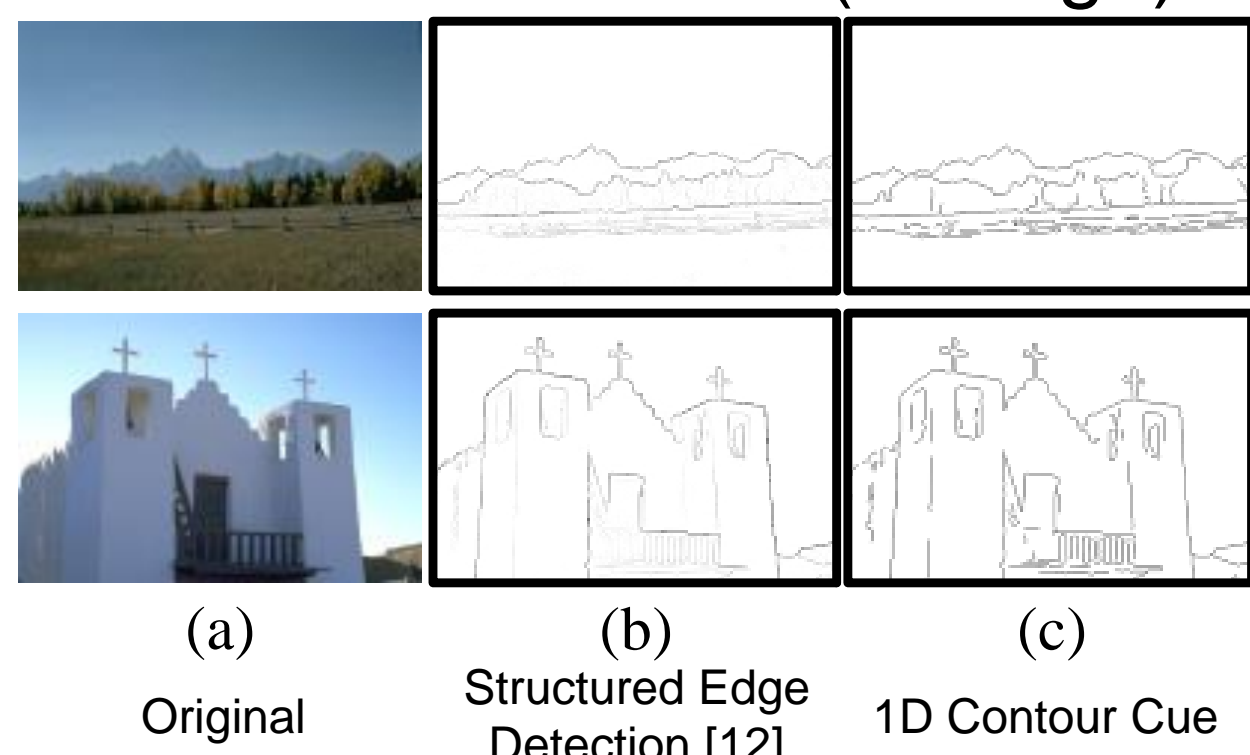


Three Complementary Cues



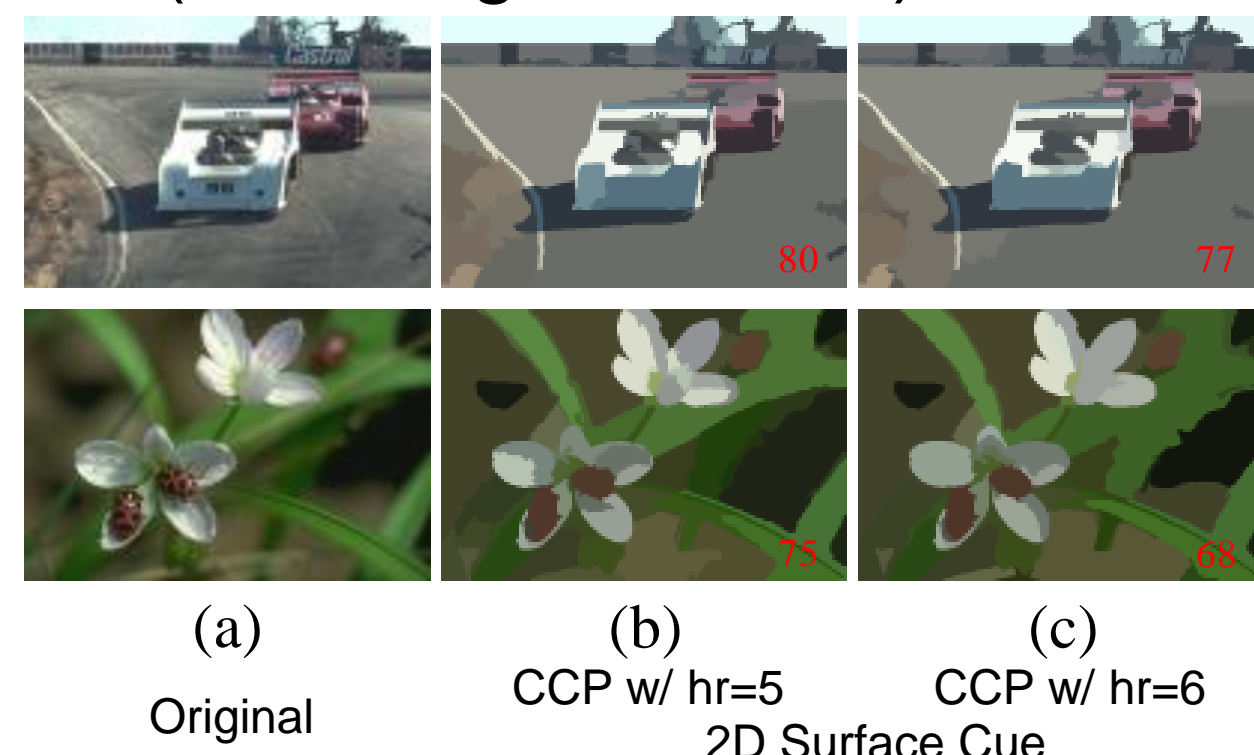
1D Contour (discontinuities)

- + More reliable if the contour is longer and more closed
- Fails if the boundary is blurred, in low contrast, or in smooth transition (leakage)



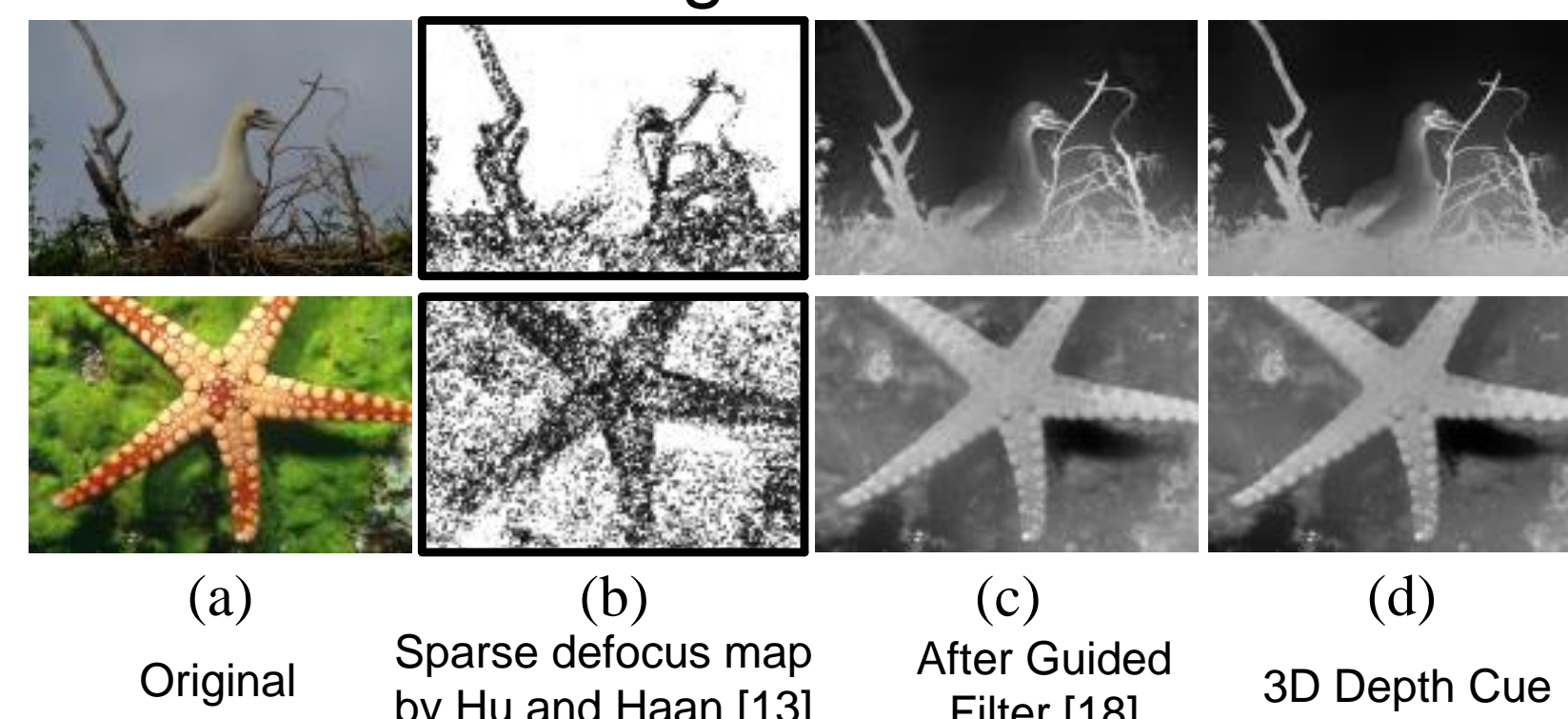
2D Surface (similarities)

- + Proved to be successful for region-based segmentation
- Unable to simplify textured regions with high variance (over-segmentation)



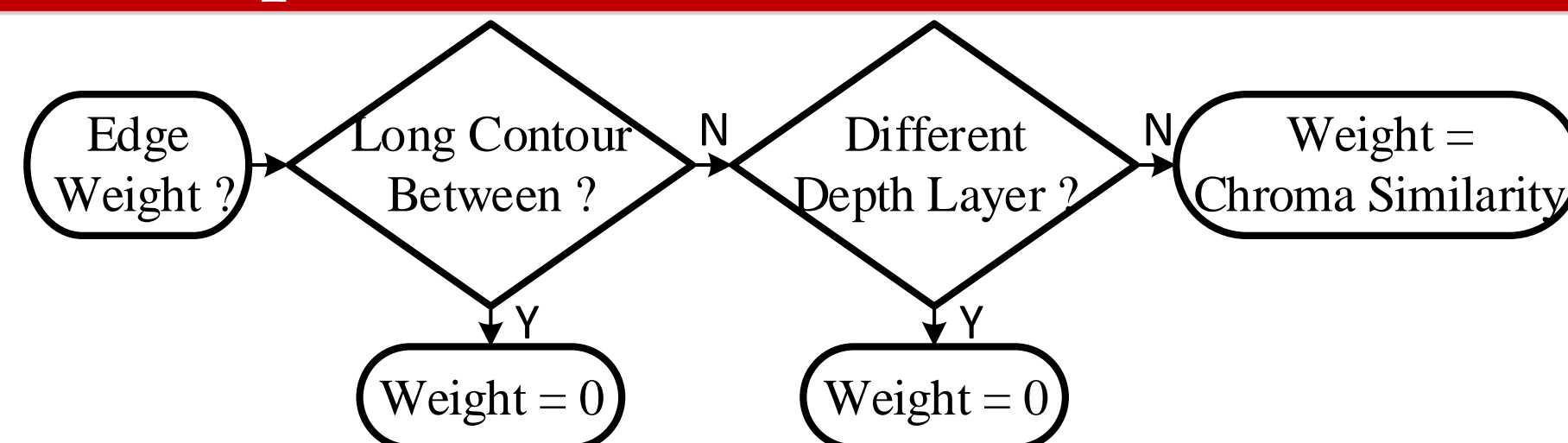
3D Depth (layout)

- + Helpful to clean the textured regions
- + Alleviate the limitations of contour and surface cues
- Unreliable if there is no edge details within these regions



Content-Dependent Spectral Graph (CDS)

- Layered affinity models use superpixel layers to connect pixels far from each other, but still questionable for affinity description
- CDS provides one solid solution
 - Reliable: long contours, large depth distance
 - Others: chroma similarity



Experiments

*Please refer to our paper for quantitative performance of the experiments.

