DEPTH FROM SINGLE IMAGE

Input

Output
LOCAL PREDICTIONS

Superpixels:

Achanta et al., PAMI’12
Train a regressor to predict superpixel depth:

→ Noisy predictions.
FAVORING CONSISTENCY

Connect the neighboring superpixels

Encourage their depths to be consistent.

Saxena et al., PAMI’09
MARKOV RANDOM FIELD

Graph with vertices and edges

Assign values to the nodes to minimize

\[ E(Y) = \sum_i \varphi(y_i) + \sum_{(i,j)} \psi(y_i, y_j) \]

unary pairwise
REASONING ABOUT EDGES

Liu et al., CVPR 2014
HIGHER ORDER TERMS

Larger regions can help reason about the scene

Zhuo et al., CVPR 2015
DEEP LEARNING WITH MRF

Liu et al., PAMI 2016
DEPTH FROM A SINGLE IMAGE

Test image  Ground-truth  Eigen et al. [3]  DCNF-FCSP

Liu et al., PAMI 2016
Using deep learning

Wang et al., CVPR 2015
NORMALS FROM A SINGLE IMAGE

Wang et al., CVPR 2015
TASK CONSISTENCY

Zamir et al., CVPR’18
STRENGTHS AND LIMITATIONS

Strengths:
• More general than shape-from-texture.
• Leverages data.

Limitations:
• Requires training data for specific scenes.
• Currently, only limited geometrical reasoning.