To improve enhancement accuracy, we introduce a weight function *w* which depends only on the measuring device. Current sensors do not have suitable capability individually.

Challenging point

- Depend on the local geometries of measuring surfaces

Previous methods use the pixel-coordinates, which is not suitable to recover the smooth geometries of measured surfaces.

Related Work

**Global Optimization Based Method**

1. Measured depth data is used as optimization data prior.
2. Various pixel-based information is used as optimization smoothness prior. (image gradient, segmentation, edge saliency, non-local mean, and co-sparseness etc.)
3. Depth enhancement is achieved by an optimization of over the image grid.

**Local Filter Based Method**

1. Local measured depth data is summarized by using similarity weights.
2. Similarity weights are defined on the global image plane coordinates. (pixel-distance, color-difference, depth gradient, and color gradientic distance, etc.)
3. Depth enhancement is achieved by local calculations on the image grid.

**Contributions**

To improve enhancement accuracy, we introduce local tangent planes as local coordinates to handle the geometries.

**3. Depth enhancement is achieved by an optimization of over the image grid.**

1. Correction of orientations based on positional relationships
2. Connection of linearly connectable tangent planes on superspecials

**Contributions**

- Dependent on local tangent planes of the uncorrupted surfaces from a noisy low-resolution depth image
- Charts defined on each local tangent of measuring surfaces

**Challenging point**

- Estimation of the local tangent planes of the uncorrupted surfaces from a noisy low-resolution depth image

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