

Intrinsic Image Decomposition using Structure-Texture Separation and Surface Normals

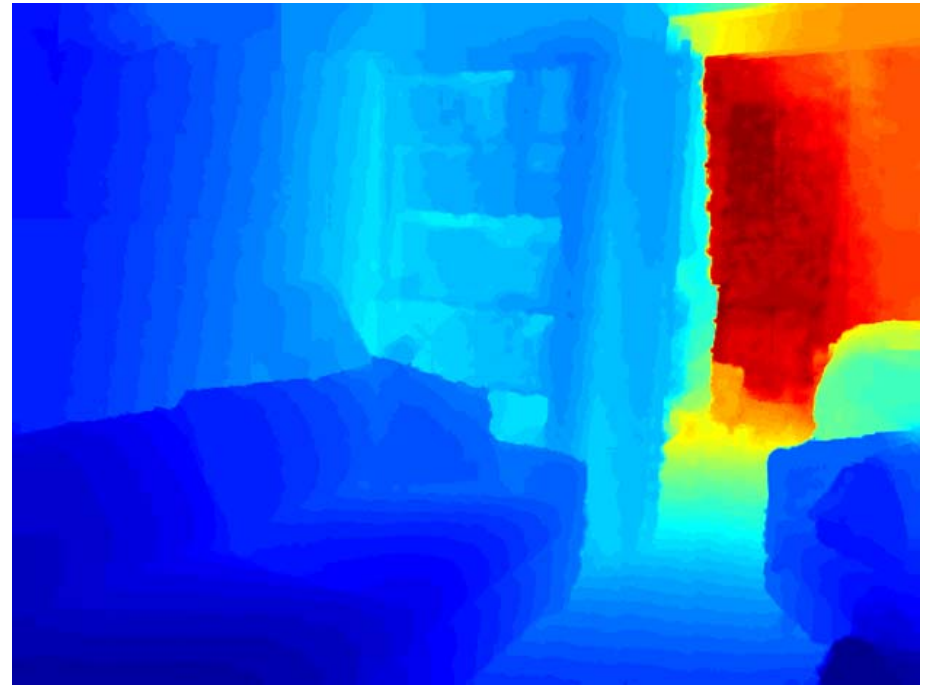
Supplementary Material

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NYU Dataset Example 1



Input RGB image



Input depth image

NYU Dataset Example 1



Reflectance



Shading

Conventional Retinex method [1]

* Conventional Retinex method cannot handle the texture at all.

NYU Dataset Example 1



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 1



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 1



Reflectance



Shading

Our method

NYU Dataset Example 1



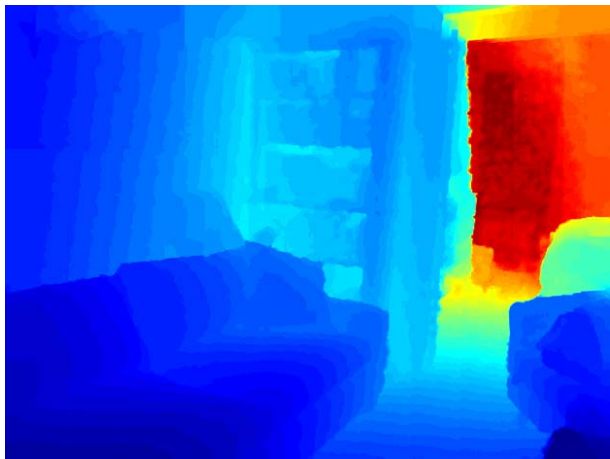
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B



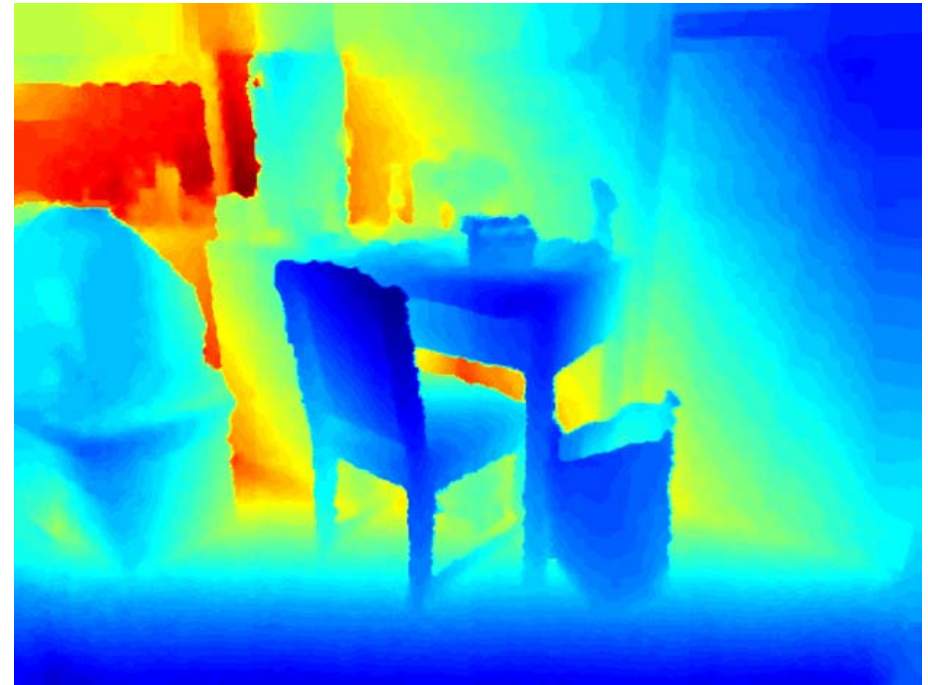
Our shading S

* Note that the reflectance R is the product of the base reflectance layer R_B and the texture layer T .

NYU Dataset Example 2



Input RGB image



Input depth image

NYU Dataset Example 2



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 2



Reflectance



Shading

Barron and Malik's method [2]

* Barron and Malik's result has artifacts around complex geometries (e.g., chair, bucket).

NYU Dataset Example 2



Reflectance



Shading

Chen and Koltun's method [3]

* Chen and Koltun's result shows global shading inconsistency (e.g., bucket and closet).

NYU Dataset Example 2



Reflectance



Shading

Our method

NYU Dataset Example 2



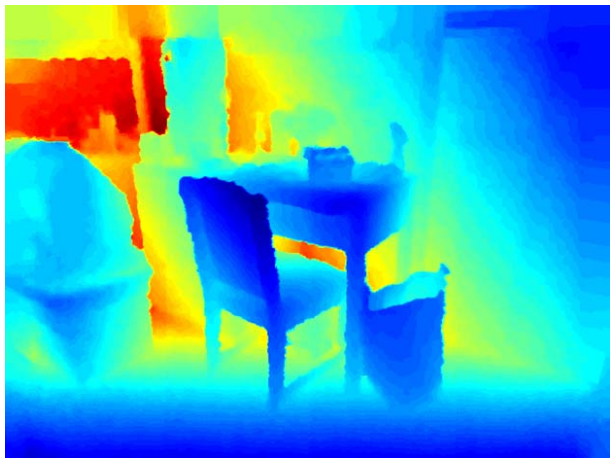
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B



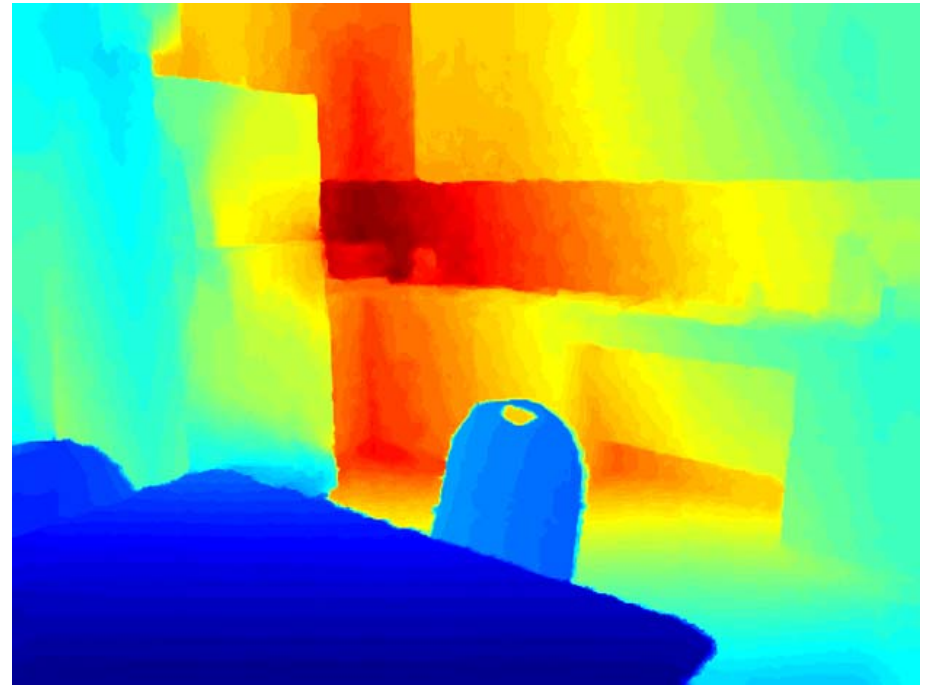
Our shading S

* In this example, some textures caused by shading remains in the reflectance image.

NYU Dataset Example 3



Input RGB image



Input depth image

NYU Dataset Example 3



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 3



Reflectance



Shading

Barron and Malik's method [2]

* Note that Barron and Malik's method is based on a colored shading model.

NYU Dataset Example 3



Reflectance



Shading

Chen and Koltun's method [3]

* Note that Chen and Koltun's method shows global shading inconsistency (e.g., chair).

NYU Dataset Example 3



Reflectance



Shading

Our method

NYU Dataset Example 3



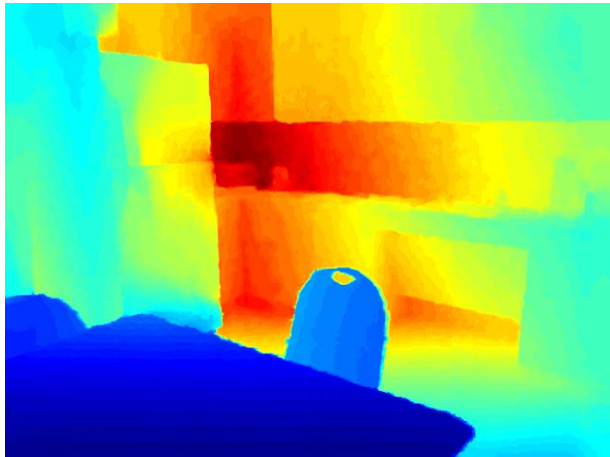
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B



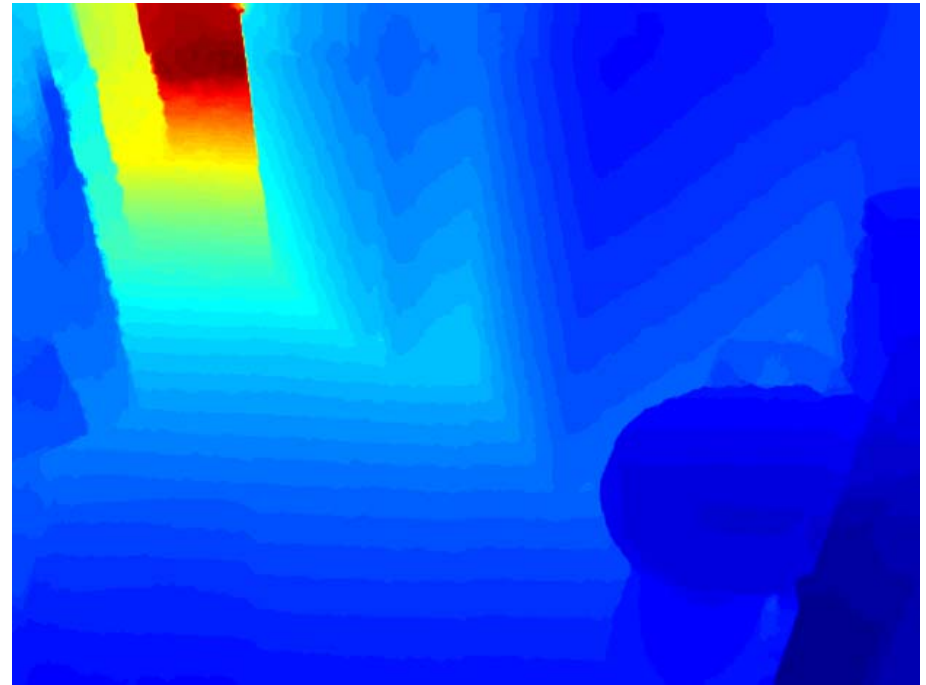
Our shading S

In this example, note that the doors of refrigerator are not a Lambertian surface, which causes mix-colored reflectance.

NYU Dataset Example 4



Input RGB image



Input depth image

NYU Dataset Example 4



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 4



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 4



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 4



Reflectance



Shading

Our method

NYU Dataset Example 4



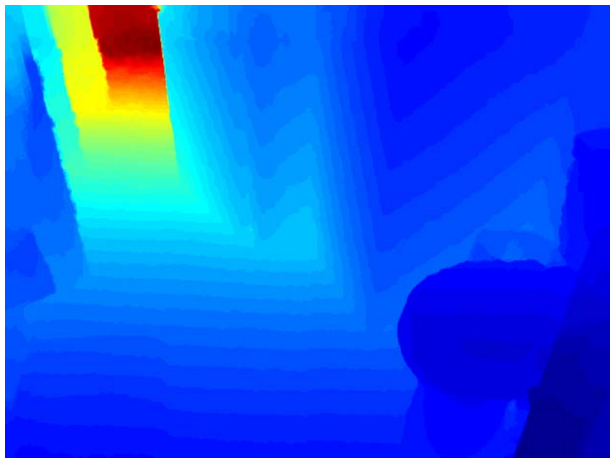
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

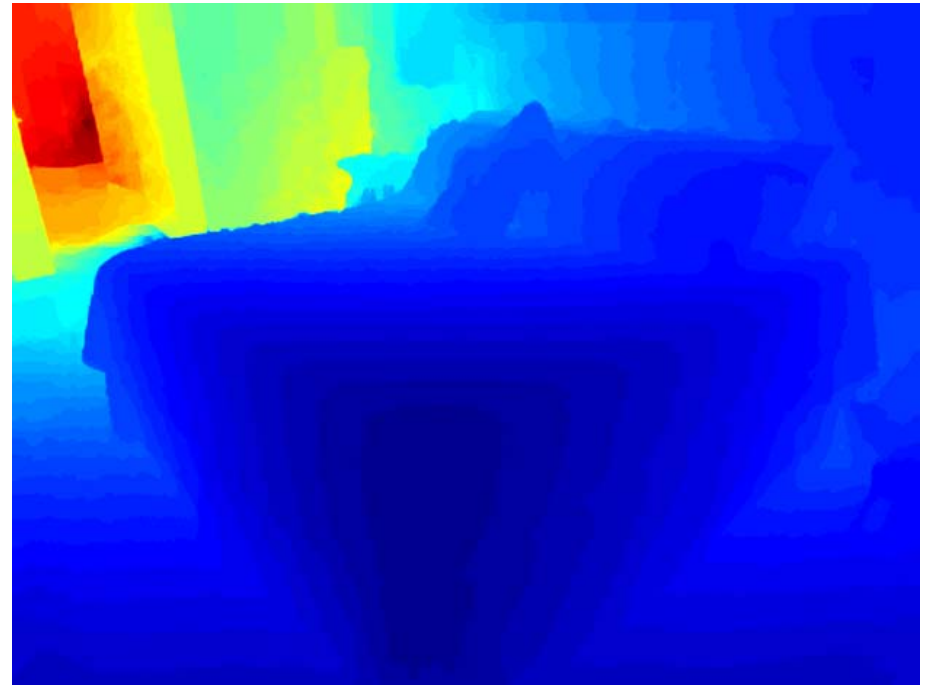


Our shading S

NYU Dataset Example 5



Input RGB image



Input depth image

NYU Dataset Example 5



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 5



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 5



Reflectance



Shading

Chen and Koltun's method [3]

* Chen and Koltun's result shows inconsistent shading between the red and white pillows

NYU Dataset Example 5



Reflectance



Shading

Our method

NYU Dataset Example 5



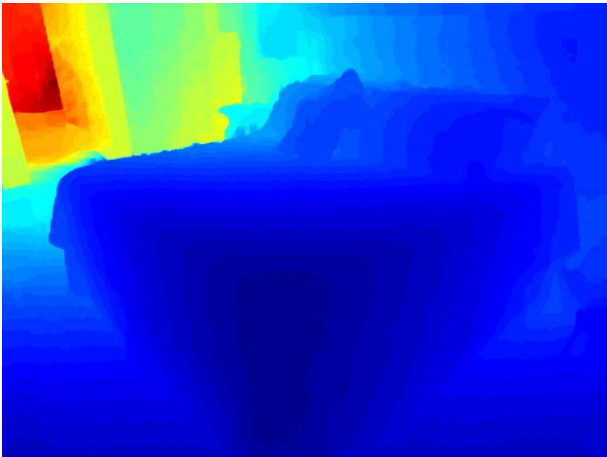
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

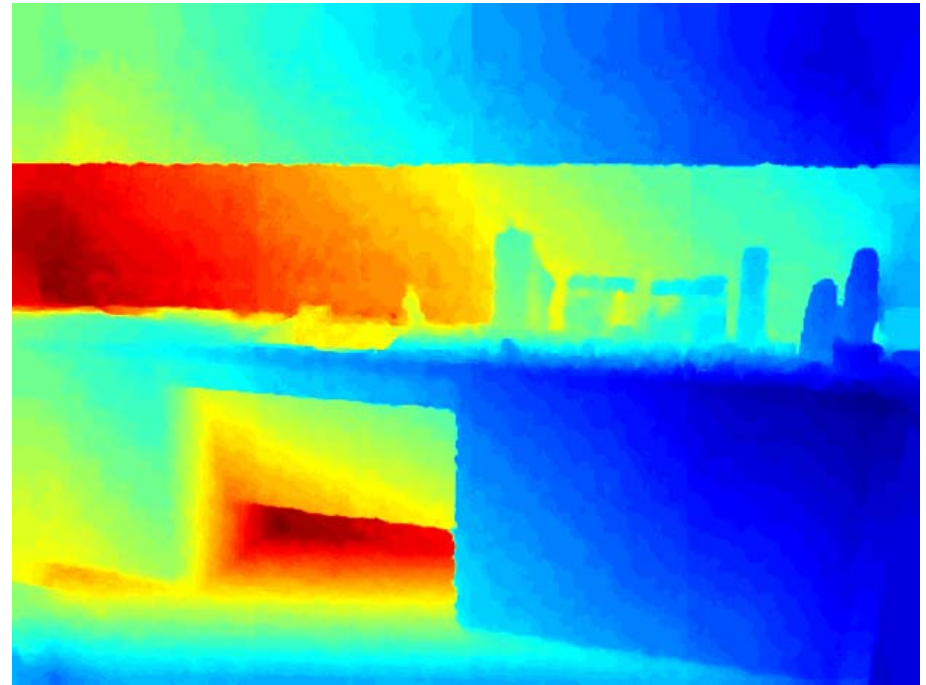


Our shading S

NYU Dataset Example 6



Input RGB image



Input depth image

NYU Dataset Example 6



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 6



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 6



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 6



Reflectance



Shading

Our method

NYU Dataset Example 6



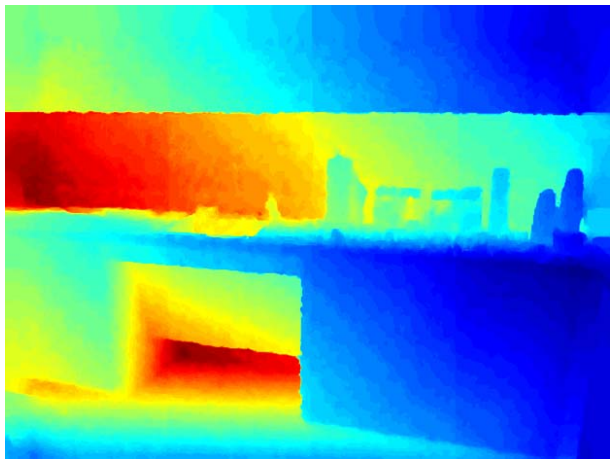
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

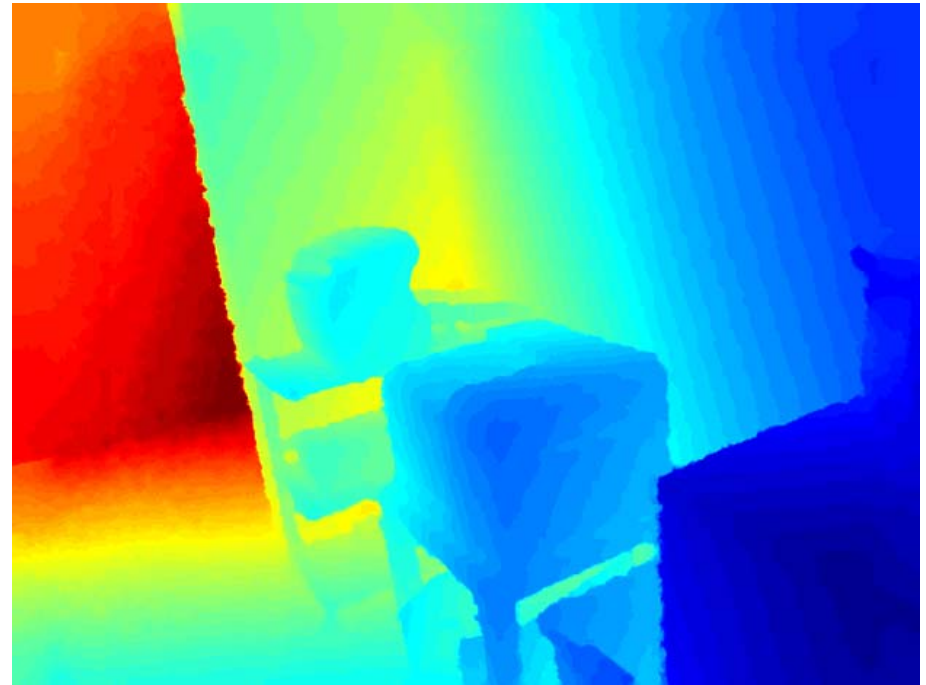


Our shading S

NYU Dataset Example 7



Input RGB image



Input depth image

NYU Dataset Example 7



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 7



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 7



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 7



Reflectance



Shading

Our method

NYU Dataset Example 7



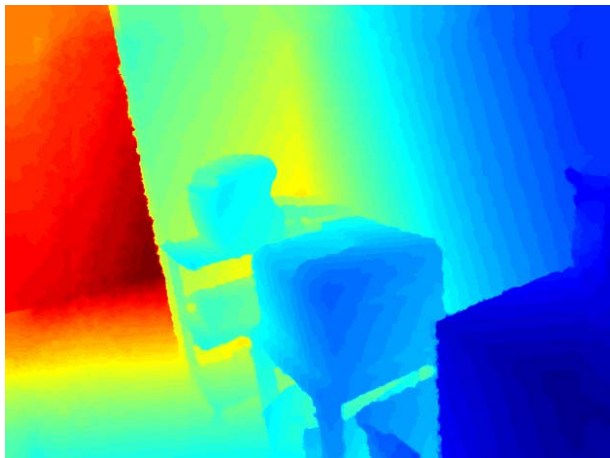
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

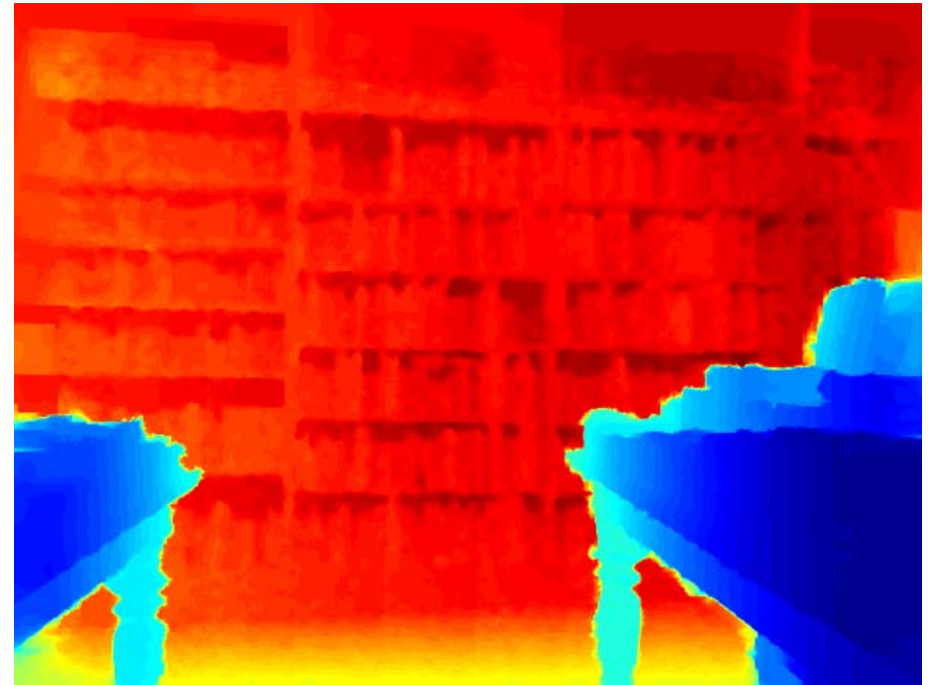


Our shading S

NYU Dataset Example 8



Input RGB image



Input depth image

NYU Dataset Example 8



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 8



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 8



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 8



Reflectance



Shading

Our method

NYU Dataset Example 8



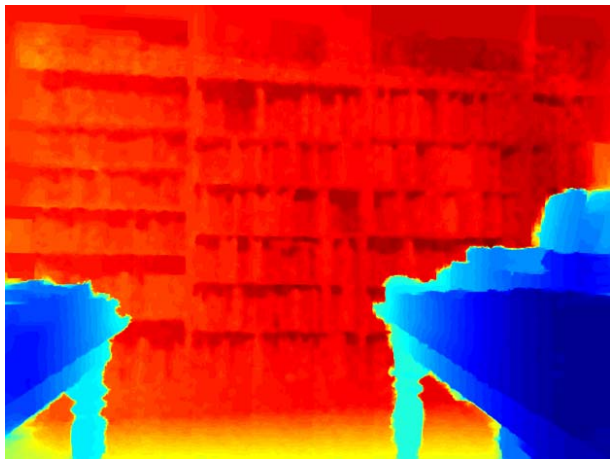
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

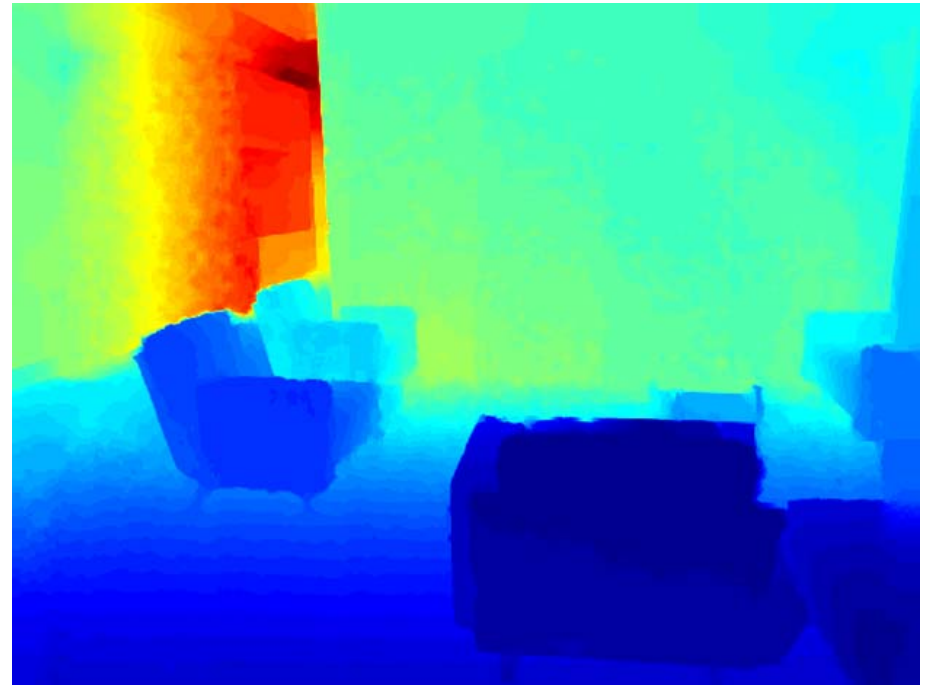


Our shading S

NYU Dataset Example 9



Input RGB image



Input depth image

NYU Dataset Example 9



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 9



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 9



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 9



Reflectance



Shading

Our method

NYU Dataset Example 9



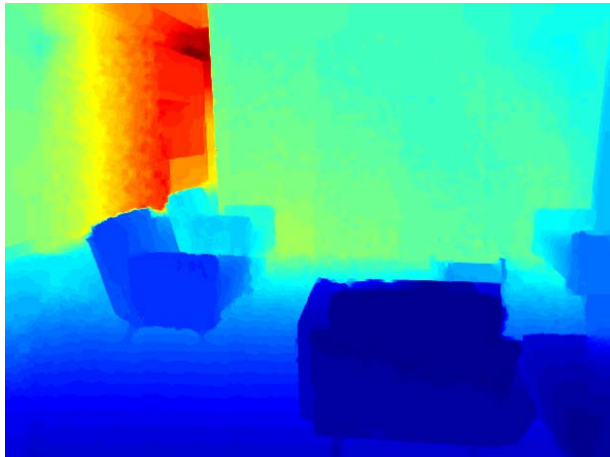
Input RGB image



Base layer B



Our reflectance R



Input depth image



Our base reflectance R_B

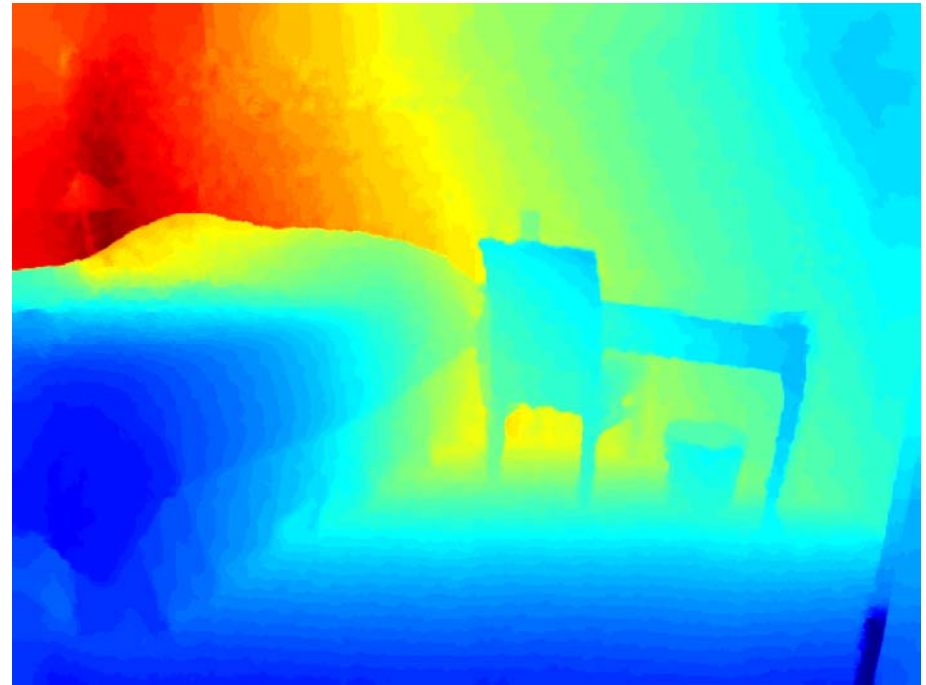


Our shading S

NYU Dataset Example 10



Input RGB image



Input depth image

NYU Dataset Example 10



Reflectance



Shading

Conventional Retinex method [1]

NYU Dataset Example 10



Reflectance



Shading

Barron and Malik's method [2]

NYU Dataset Example 10



Reflectance



Shading

Chen and Koltun's method [3]

NYU Dataset Example 10



Reflectance



Shading

Our method

NYU Dataset Example 10



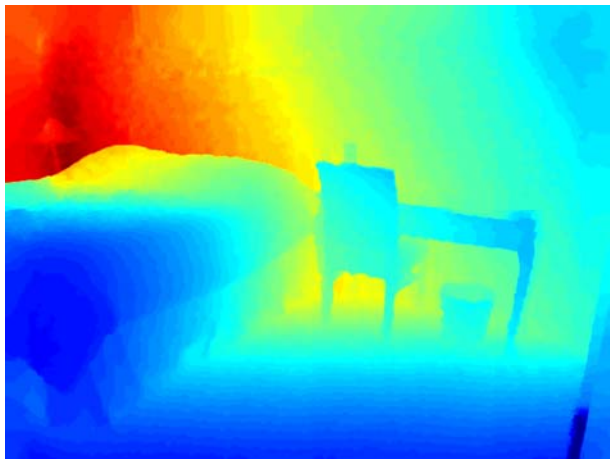
Input RGB image



Base layer B



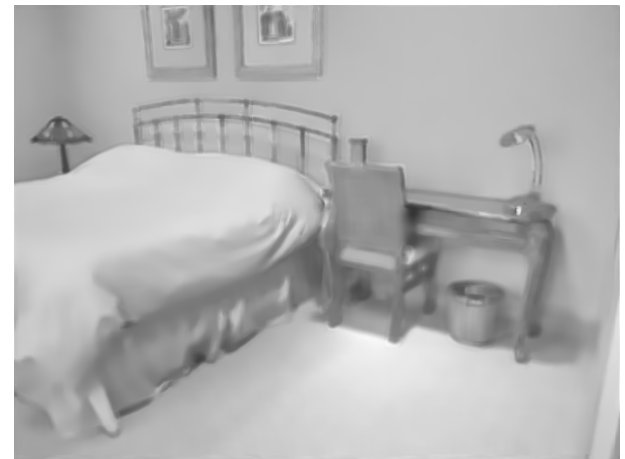
Our reflectance R



Input depth image



Our base reflectance R_B



Our shading S

Existing Methods with Texture Filtering Step

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering

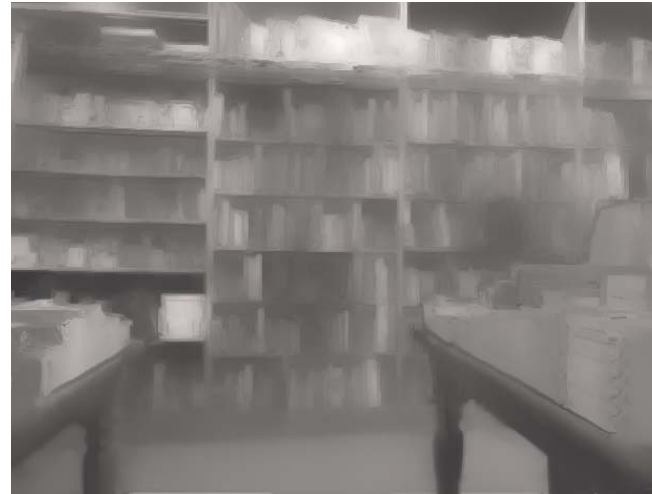


With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

Chen et al.

Ours

* Note that our result still outperforms the result of existing methods with texture filtering step.

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

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Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex



Barron et al.



Chen et al.



Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Conventional Retinex method [1]

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering

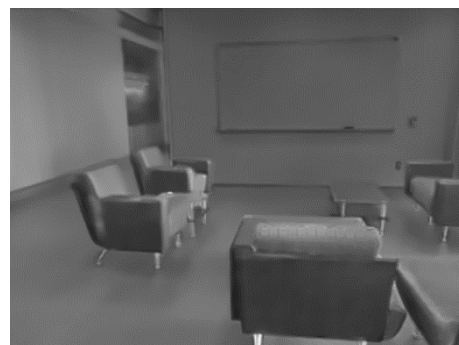
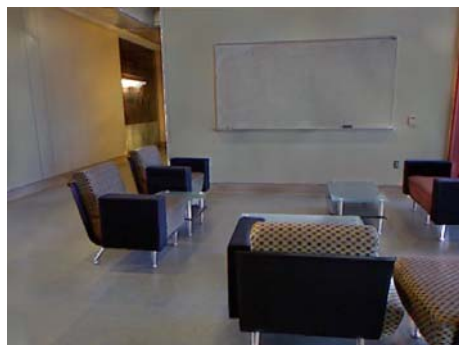
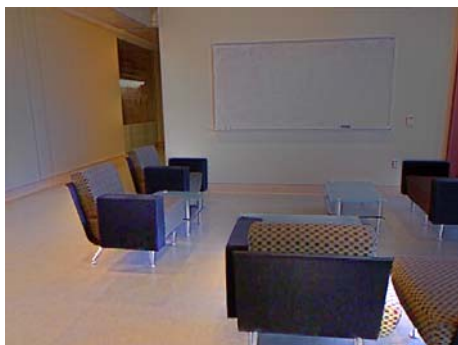


Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

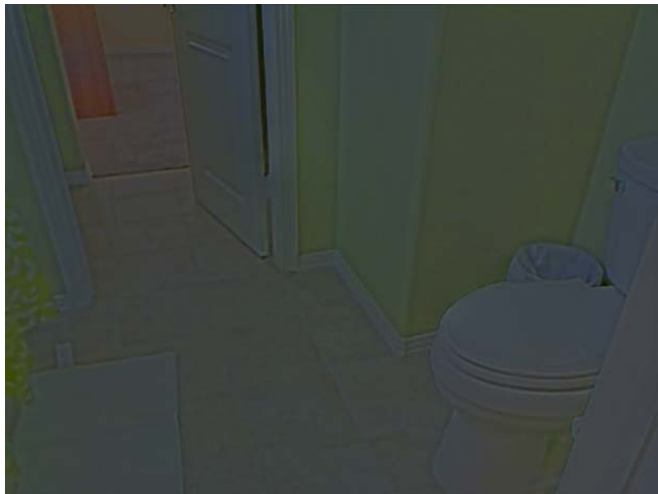
Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering

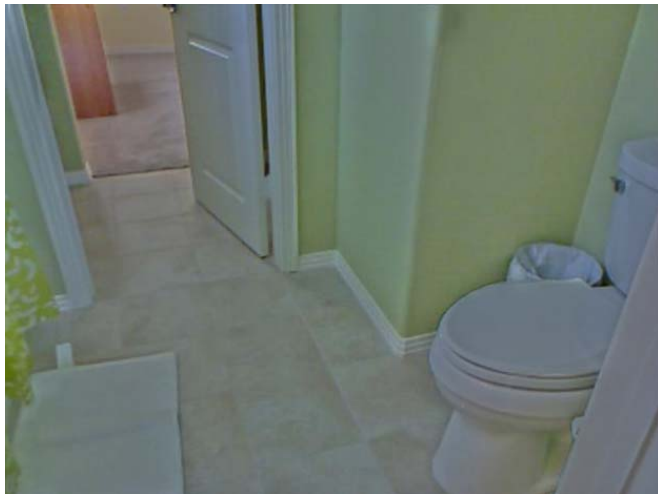


With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering

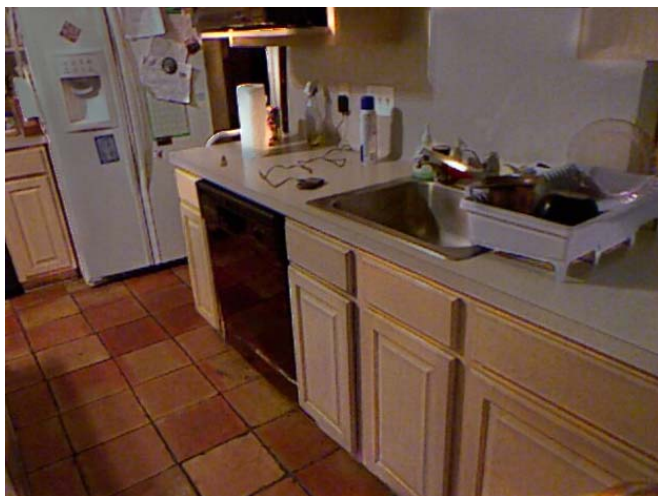


With
texture filtering

Existing Methods with Texture Filtering

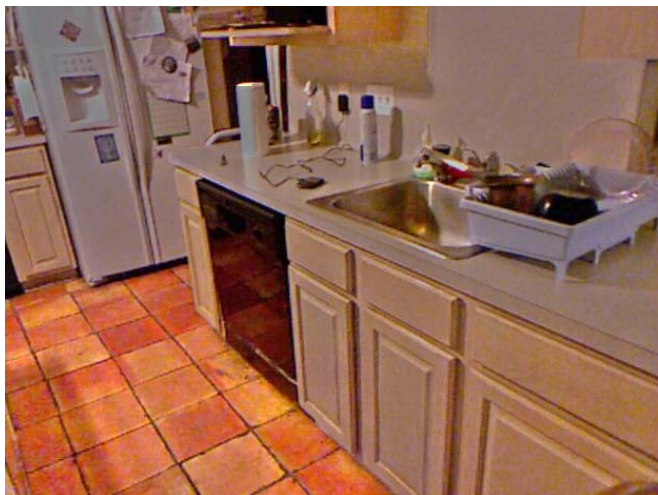


Without
texture filtering

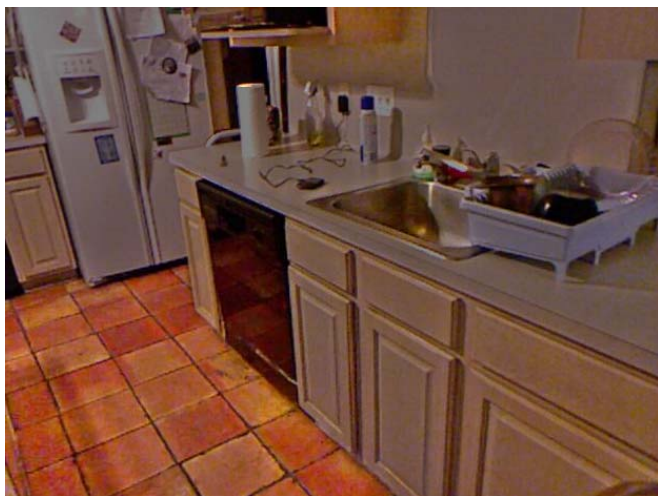


With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

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Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

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Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering

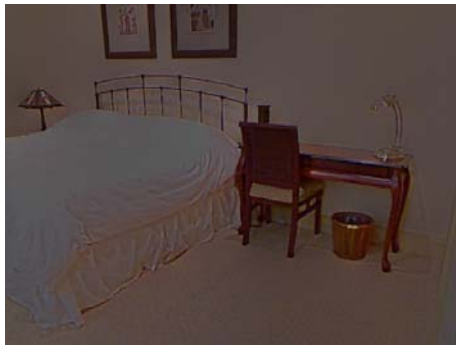


Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering

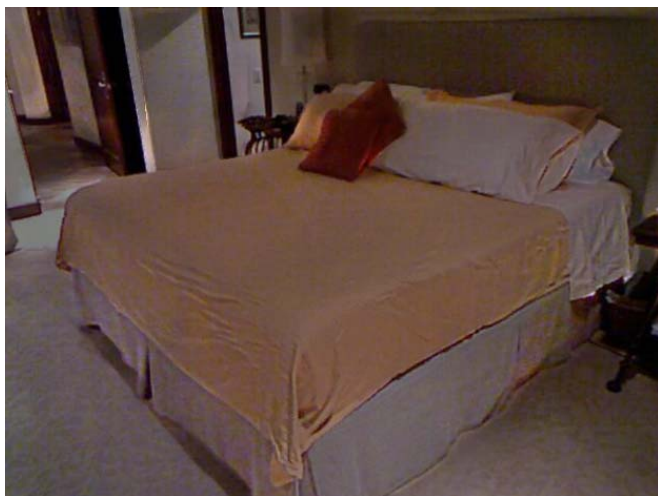


With
texture filtering

Existing Methods with Texture Filtering

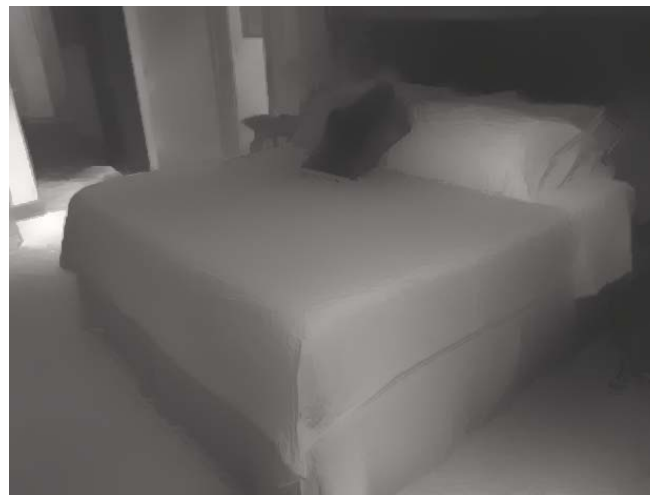


Without
texture filtering

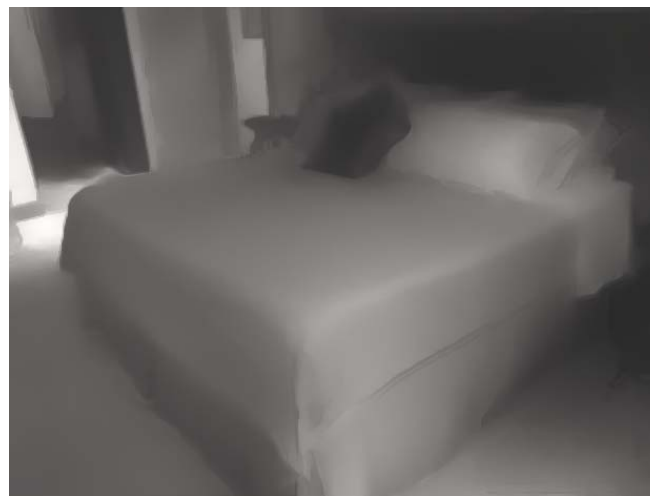


With
texture filtering

Existing Methods with Texture Filtering

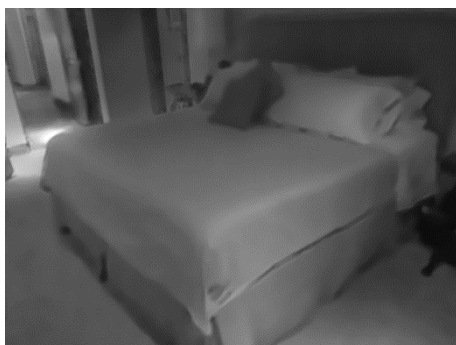


Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex

Barron et al.

Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering

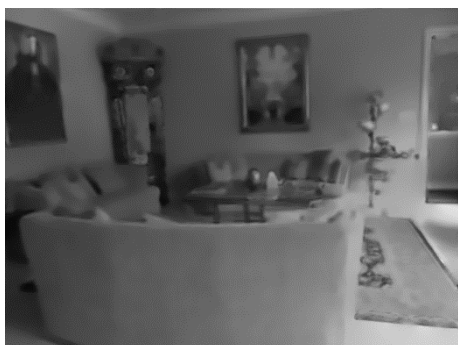
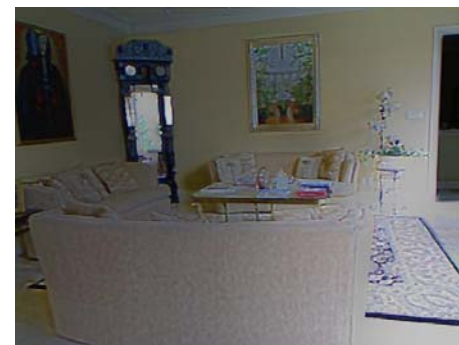
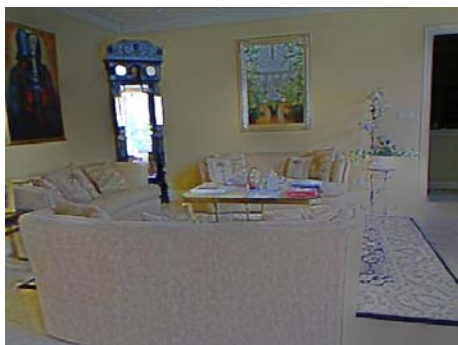


Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



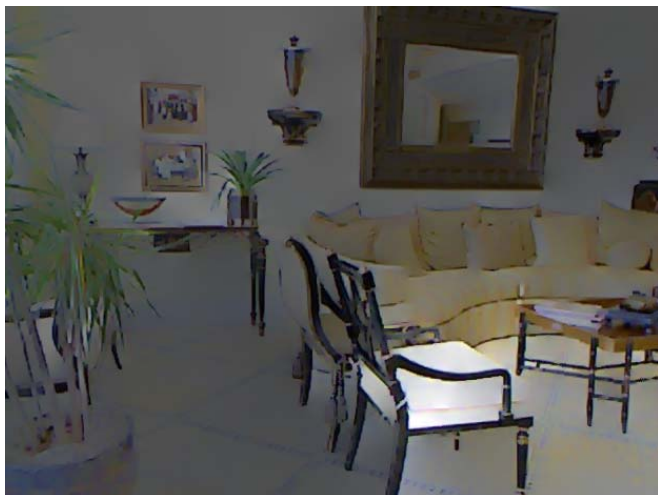
Retinex

Barron et al.

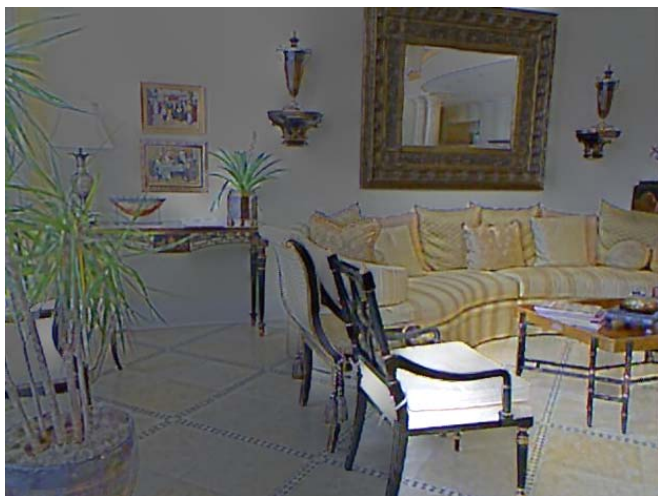
Chen et al.

Ours

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering

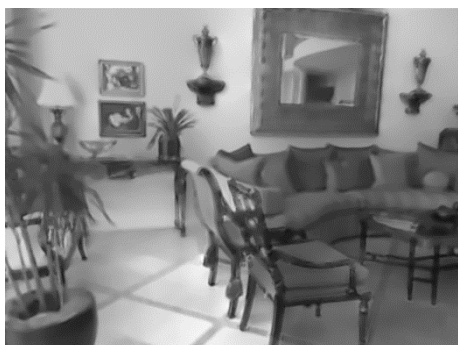
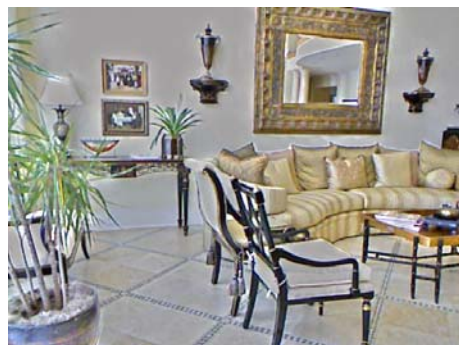
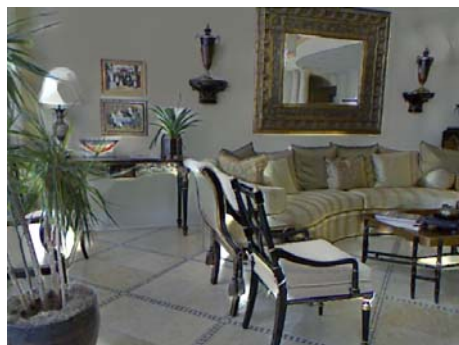
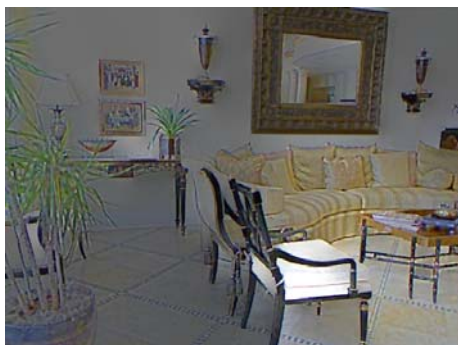


Without
texture filtering



With
texture filtering

Existing Methods with Texture Filtering



Retinex



Barron et al.



Chen et al.



Ours

Thank You

References

- [1] Grosse, R., Johnson, M.K., Adelson, E.H., Freeman, W.T.: Ground truth dataset and baseline evaluations for intrinsic image algorithms. In: Proc. of ICCV. (2009)
- [2] Barron, J.T., Malik, J.: Intrinsic scene properties from a single RGB-D image. In: Proc. of CVPR. (2013)
- [3] Chen, Q., Koltun, V.: A simple model for intrinsic image decomposition with depth cues. In: Proc. of ICCV. (2013)