Deep Posterior Distribution-Based Embedding for Hyperspectral Image Super-Resolution

A: Single hyperspectral image super-resolution: although various network architectures/convolutions have been designed to effectively utilize high-dimensional spectral information to achieve high reconstruction quality, they are based on human knowledge and empirical design, which may not be optimal, thereby limiting performance.

B: Fusion-based hyperspectral image super-resolution, which adopts additional data (e.g., HR RGB images) to improve performance. However, this method highly depends on additional co-registered HR images, which may be difficult to obtain.

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Firstly, a coarse HR-HS image is initialized, and then iteratively refined by learning residual maps from the differences between the input LR-HS image and the pseudo-LR-HS image re-degenerated from the reconstructed HR-HS image.

- **These 3 common HS image data sets are used to evaluate the performance of PDE-Net:**

CAVE,

Harvard

NCALM

- **Three widely used metrics to quantitatively assess the quality of reconstructed HR-HS images：**

Average peak signal-to-noise ratio （MPSNR）

Mean structure similarity （MSSIM）

Spectral angle mapper （SAM）

(For MPSNR and MSSIM, bigger is better. For SAM, smaller is better)

- **PDE-Net is compared with five state-of-the-art deep learning-based methods:**

3DFCNN

3DGAN

SSPSR

MCNet

ERCSR

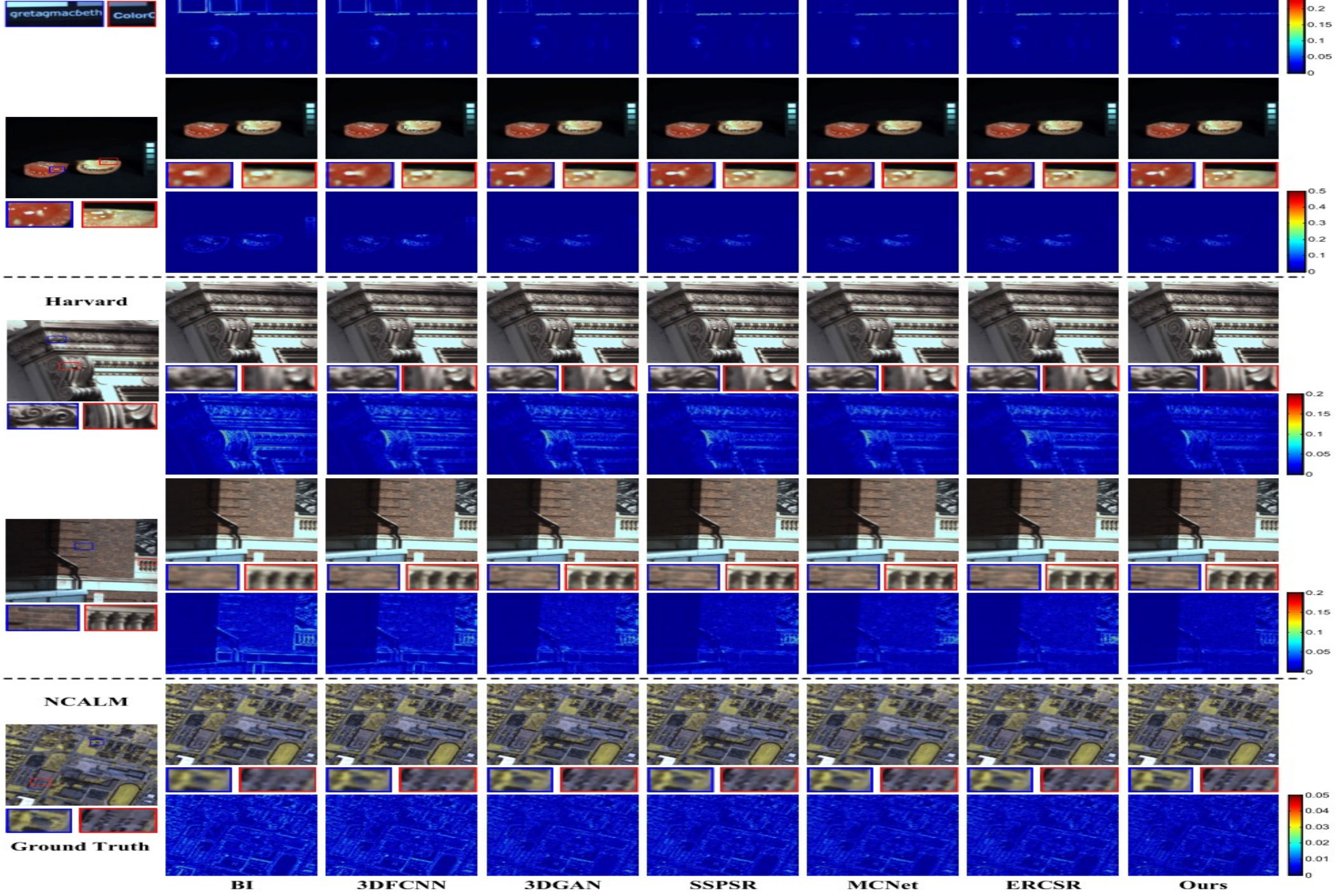

Fig. 4. Visual comparisons of different methods with $\alpha = 4$. For ease of comparison, we visualized the reconstructed HS images in the form of RGB images

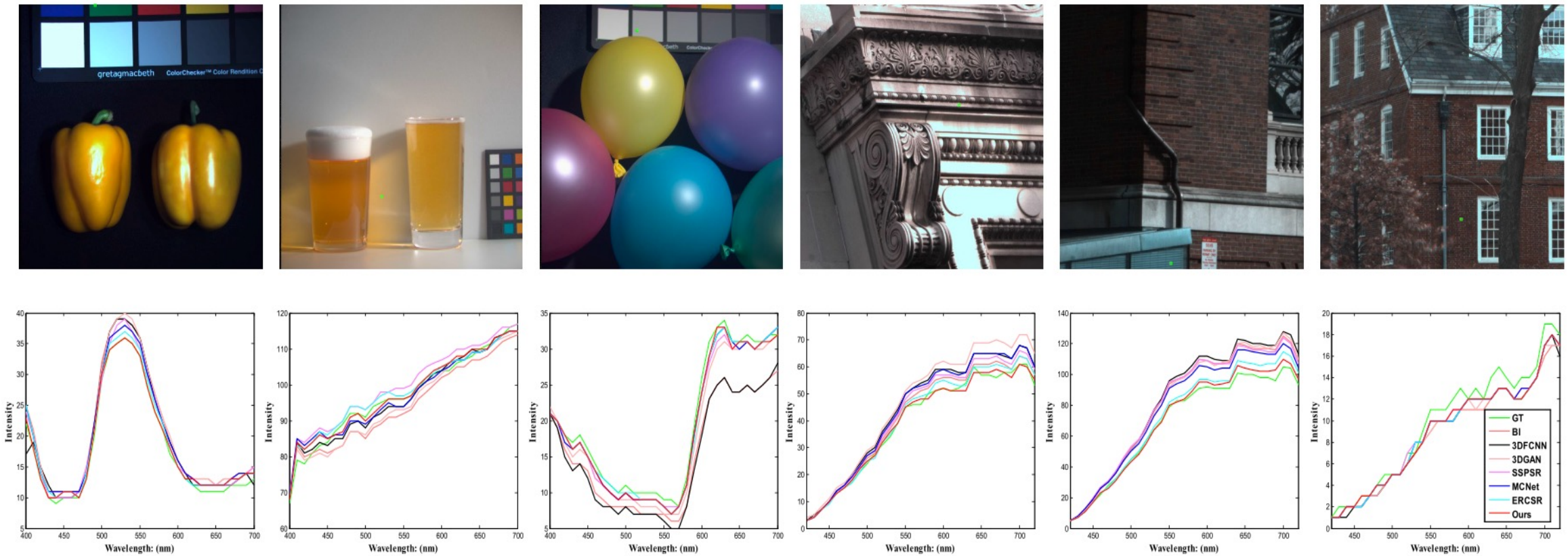

Fig. 5. Visual comparison of the spectral signatures of pixels reconstructed by different methods. The positions of the corresponding pixels are marked by the green dot in RGB images. The spectral signatures by our PDE-Net are much closer to the ground-truth ones than the other compared methods, especially on the 1^{st} and 4^{th} columns.

PDE-Net

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