**EXAMPLE BASED IMAGE SUPER-RESOLUTION**

There are two types of Example Based Image Super-Resolution

**INTERNAL EXAMPLE BASED IMAGE SR METHODS**

1. Image and video upscaling from local self-examples[1].
2. Super-resolution from a single image [2].
3. Improving resolution by image registration [3].
4. Fast image super-resolution based on in-place example regression [4].

**EXTERNAL EXAMPLE BASED IMAGE SR METHODS**

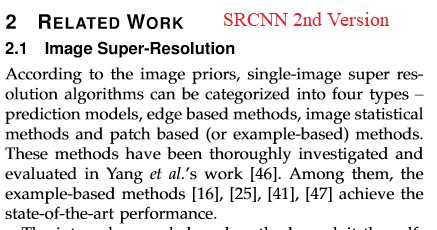
1. Low-complexity single-image super-resolution based on nonnegative neighbor embedding [5].
2. Super-resolution through neighbor embedding [6].
3. Learning low-level vision [7].
4. Image transformation based on learning dictionaries across image spaces [8].
5. Anchored neighborhood regression for fast example-based super-resolution [9].
6. Coupled dictionary training for image super-resolution [10].
7. Image super-resolution as sparse representation of raw image patches [11].
8. Image super-resolution via sparse representation [12].
9. On single image scale-up using sparse-representations [13]

**SPARSE CODING BASED IMAGE SR METHODS**

The sparse-coding-based method is one of the representative methods for external example-based image super-resolution. This method involves several steps in its pipeline. First, overlapping patches are densely extracted from the image and pre-processed (e.g., subtracting mean). These patches are then encoded by a low-resolution dictionary. The sparse coeﬃcients are passed into a high-resolution dictionary for reconstructing high-resolution patches. The overlapping reconstructed patches are aggregated (or averaged) to produce the output.

**MAIN METHODS ARE AS UNDER**

1. Image super-resolution as sparse repre-sentation of raw image patches [14].
2. Image super-resolution via sparse representation [12].



References

[1] G. Freedman and R. Fattal, "Image and video upscaling from local self-examples," *ACM Transactions on Graphics (TOG),* vol. 30, no. 2, p. 12, 2011.

[2] D. Glasner, S. Bagon, and M. Irani, "Super-resolution from a single image," in *Computer Vision, 2009 IEEE 12th International Conference on*, 2009, pp. 349-356: IEEE.

[3] M. Irani and S. Peleg, "Improving resolution by image registration," *CVGIP: Graphical models and image processing,* vol. 53, no. 3, pp. 231-239, 1991.

[4] J. Yang, Z. Lin, and S. Cohen, "Fast image super-resolution based on in-place example regression," in *Proceedings of the IEEE conference on computer vision and pattern recognition*, 2013, pp. 1059-1066.

[5] M. Bevilacqua, A. Roumy, C. Guillemot, and M. L. Alberi-Morel, "Low-complexity single-image super-resolution based on nonnegative neighbor embedding," 2012.

[6] H. Chang, D.-Y. Yeung, and Y. Xiong, "Super-resolution through neighbor embedding," in *Proceedings of the 2004 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2004. CVPR 2004.*, 2004, vol. 1, pp. I-I: IEEE.

[7] W. T. Freeman, E. C. Pasztor, and O. T. Carmichael, "Learning low-level vision," *International journal of computer vision,* vol. 40, no. 1, pp. 25-47, 2000.

[8] K. Jia, X. Wang, and X. Tang, "Image transformation based on learning dictionaries across image spaces," *IEEE transactions on pattern analysis and machine intelligence,* vol. 35, no. 2, pp. 367-380, 2012.

[9] R. Timofte, V. De Smet, and L. Van Gool, "Anchored neighborhood regression for fast example-based super-resolution," in *Proceedings of the IEEE International Conference on Computer Vision*, 2013, pp. 1920-1927.

[10] J. Yang, Z. Wang, Z. Lin, S. Cohen, and T. Huang, "Coupled dictionary training for image super-resolution," *IEEE transactions on image processing,* vol. 21, no. 8, pp. 3467-3478, 2012.

[11] J. Yang, J. Wright, T. Huang, and Y. Ma, "Image super-resolution as sparse representation of raw image patches," in *2008 IEEE conference on computer vision and pattern recognition*, 2008, pp. 1-8: Citeseer.

[12] J. Yang, J. Wright, T. S. Huang, and Y. Ma, "Image super-resolution via sparse representation," *IEEE transactions on image processing,* vol. 19, no. 11, pp. 2861-2873, 2010.

[13] R. Zeyde, M. Elad, and M. Protter, "On single image scale-up using sparse-representations," in *International conference on curves and surfaces*, 2010, pp. 711-730: Springer.

[14] Y. Jianchao, J. Wright, T. Huang, and Y. Ma, "Image super-resolution as sparse representation of raw image patches," in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition*, 2008, pp. 1-8.