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## Single-Frame Image Super-resolution through Contourlet Learning

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## **Abstract**

We propose a learning-based, single-image super-resolution reconstruction technique using the contourlet transform, which is capable of capturing the smoothness along contours making use of directional decompositions. The contourlet coefficients at finer scales of the unknown high-resolution image are learned locally from a set of high-resolution training images, the inverse contourlet transform of which recovers the super-resolved image. In effect, we learn the high-resolution representation of an oriented edge primitive from the training data. Our experiments show that the proposed approach outperforms standard interpolation techniques as well as a standard (Cartesian) wavelet-based learning both visually and in terms of the PSNR values, especially for images with arbitrarily oriented edges.

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