Improving image fidelity by luma-assisted chroma subsampling

Chroma subsampling is commonly used for digital representations of images and video sequences. The basic rationale behind chroma subsampling is that the human visual system is less sensitive to color variations than luma variations. Therefore, chroma data can be coded in lower resolution than luma data, without noticeable loss in perceived image quality. In this paper, we compare different upsampling methods for chroma data and show that by using advanced upsampling schemes the fidelity of the reconstructed image can be significantly improved. We also present an adaptive upsampling method that uses full resolution luma information to assist chroma upsampling. Experimental results show that in the presence of compression noise, the proposed technique steadily outperforms advanced non-assisted upsampling.