

Re: interpolation for a color image?

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 - *Date:* Mon, 26 May 2008 22:28:07 +0000 (UTC)
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Harris <xgeorgiou@xxxxxxxxxxxxxxxx> writes:

My answer is this: bilinear is not a good interpolation method but it is fast. Since it works in 2D, it requires 12 multiplications and 4 divisions per (new) pixel estimate. If you have any doubt, see: http://en.wikipedia.org/wiki/Bilinear_interpolation. Your "paraphrase" of what I initially proposed is too slow, because you don't really need all these conversions, only an intensity estimate (RGB → mono) and the original image:

- (1). $I(x,y) = a*R(x,y)+b*G(x,y)+c*B(x,y)$
- (2). apply bilinear interpolation on $I(x,y)$
- (3). convert back to RGB

Step 2 is the same as above, e.g. 12 multiplications and 4 divisions for bilinear per (new) pixel value.
Step 3 can be implemented using the original channel value and the value range: if $I'(x,y)$ is the interpolated value, then new Red is: $R'(x,y) = I'(x,y)/I(x,y) * R(x,y)$.

The problem I see with this is that you're effectively calculating the higher-resolution image by recombining a luminance/intensity image that was obtained by linear interpolation and colour information that was upsampled by nearest-neighbour. The latter is a terrible upsampling method that doesn't actually interpolate anything.

In the case where the original has two adjacent pixels of similar colour but different intensity, the larger output image will smoothly interpolate that intensity across the original one-pixel distance. But if the two pixels have the same intensity but different colour, there will be an abrupt colour change half-way along a line between the

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two original pixel locations. So the colour component of the image will have some nasty artifacts in it.

Now, you can argue that under certain viewing conditions, your eye's colour resolution is bad enough that you can't see the colour artifacts, so they don't matter. True. But you will get an image that looks significantly worse up-close than interpolating in