Subject: Re: Image correction for human perception?
Posted by b_gom on Mon, 02 Oct 2006 17:57:18 GMT
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Hi Maye,

> But after we have our calibrated images in the 3 colours and put this
> together to a colour image, why would we have to correct for the human
> eye spectral sensitivity, if looking at the image at the screen
> (provided my display system works ideal) will automatically involve the
> eye's sensitivity?

When it comes to color science, 90% of the problem is terminology.

OK, assume you have a perfectly calibrated spectrometer that gives you the true spectrum of the image across the visible band, or you have a good 3-color CCD system with known filter characteristics. Now, the goal is to put something on a screen that looks like the original scene to the average observer.

In principle, all you need to do is figure out what the relative brightness each of the 3 cones in the eye would register when looking at your perfect spectrum. CIE has established some reasonably accurate spectral sensitivity curves (color matching functions) that allow you to do just this. Now you just need to take these 3 values and pass them through your perfectly calibrated video card and ideal display. In reality, this means you have to correct the image for the limitations of the software and hardware in order to produce an output that is reasonably close to what the original spectrum would 'look like'. This is where things like 'rendering intent' come in and complicate the whole color correction process.

Of course, there are other problems too, such as how room lighting actually affects what colors you think you see. For example a sheet of paper looks white under incandescent light as well as in sunlight, even though it is actually more 'red' in the first case. This is true for monitors as well.. Also, not everyone is the same as the CIE standard observer.

As an exercise, take a digital picture out your window. Load it onto your monitor. If you're really lucky, it might almost look the same color as the original. Now put a second monitor next to the first, and display the image on both. Your luck has probably run out. Which one is the true color?

Check out http://www.normankoren.com/color_management.html for a good summary and links to other color science documents.

Of course, all of this is completely different from the problem of displaying data for either colors or intensities that the eye cannot perceive..

Brad

maye wrote:
> Hi!
> We have an interesting discussion going on here about the need of
> correcting intensities of remote sensing data in red, green and blue
> filters for the perception of the human eye to create a 'TRUE' color
> image.
> Basically, at the moment we tend to believe it's not necessary, because
> we have a good linear detection system (a CCD),
> so all we need to correct is the filter absorption (plus the usual CCD
> tralala of course).
> But after we have our calibrated images in the 3 colours and put this
> together to a colour image, why would we have to correct for the human
> eye spectral sensitivity, if looking at the image at the screen
> (provided my display system works ideal) will automatically involve the
> eye's sensitivity?
> Would the best way to display remote sensing data to the human eye not
> be, to try to show the exact same relative intensities like detected at
> the place of observation?
> What makes us doubt is the amount of publications one can find
> mentioning a "correction for human eye perception" and we fear, that
> they cannot ALL be wrong! :)
> So what do we miss? Is the problem maybe, that we only have data of 3
> filters and there's of course more? But the television works like that
> and can create quite realistic images, so it shouldn't be the problem?
> Thanks for your enlightenment!
> Regards,
> Michael
