

Nikon D2x Characterization for HDR-from-NEF Images

(Updated: 5/21/07)

Fit 3x3 with no intercept from test scene using only bright checker and black behind it (CS-100 signal was too low on the dim checker and linearity was confirmed).

The normalized fit is ...

$$\begin{array}{l|l} X & \begin{array}{ccc} 0.4803 & 0.5502 & 0.1040 \end{array} \\ Y & \begin{array}{ccc} 0.1904 & 0.7646 & 0.0450 \end{array} \\ Z & \begin{array}{ccc} -0.0096 & 0.0487 & 0.3805 \end{array} \end{array} \begin{array}{l} R \\ G \\ B \end{array}$$

The R² values for XYZ are (0.998, 0.997, 0.992) respectively.

For that scene the normalization factor to get to absolute luminance is 7.68.

For most images, that have been color balanced, the matrix should be normalized to a desired white point. The D65-normalized matrix (CIE 1931) is ...

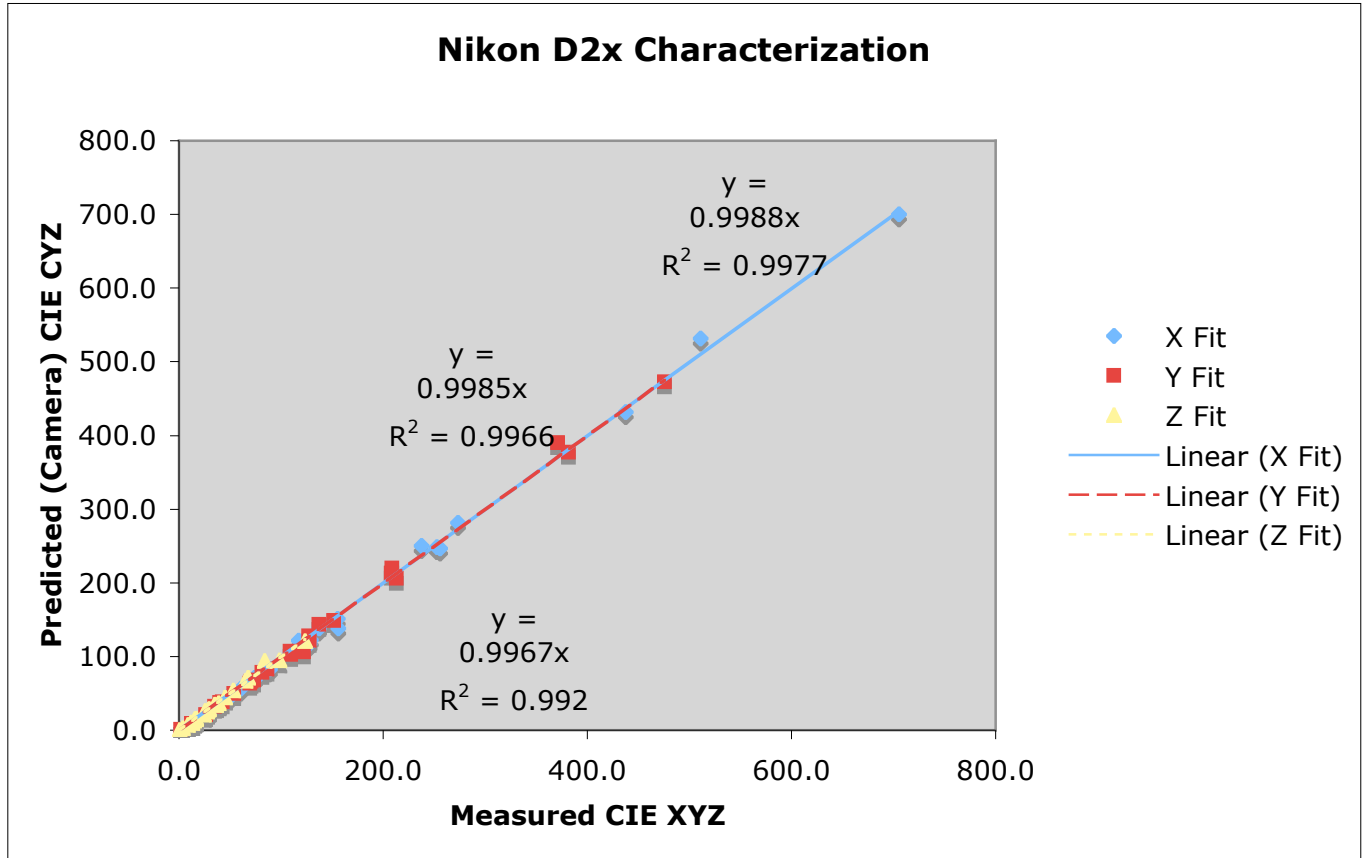
$$\begin{array}{l|l} X & \begin{array}{ccc} 0.4024 & 0.4610 & 0.0871 \end{array} \\ Y & \begin{array}{ccc} 0.1904 & 0.7646 & 0.0450 \end{array} \\ Z & \begin{array}{ccc} -0.0249 & 0.1264 & 0.9873 \end{array} \end{array} \begin{array}{l} R \\ G \\ B \end{array}$$

The above matrix is the one to use for most, if not all, HDR images.

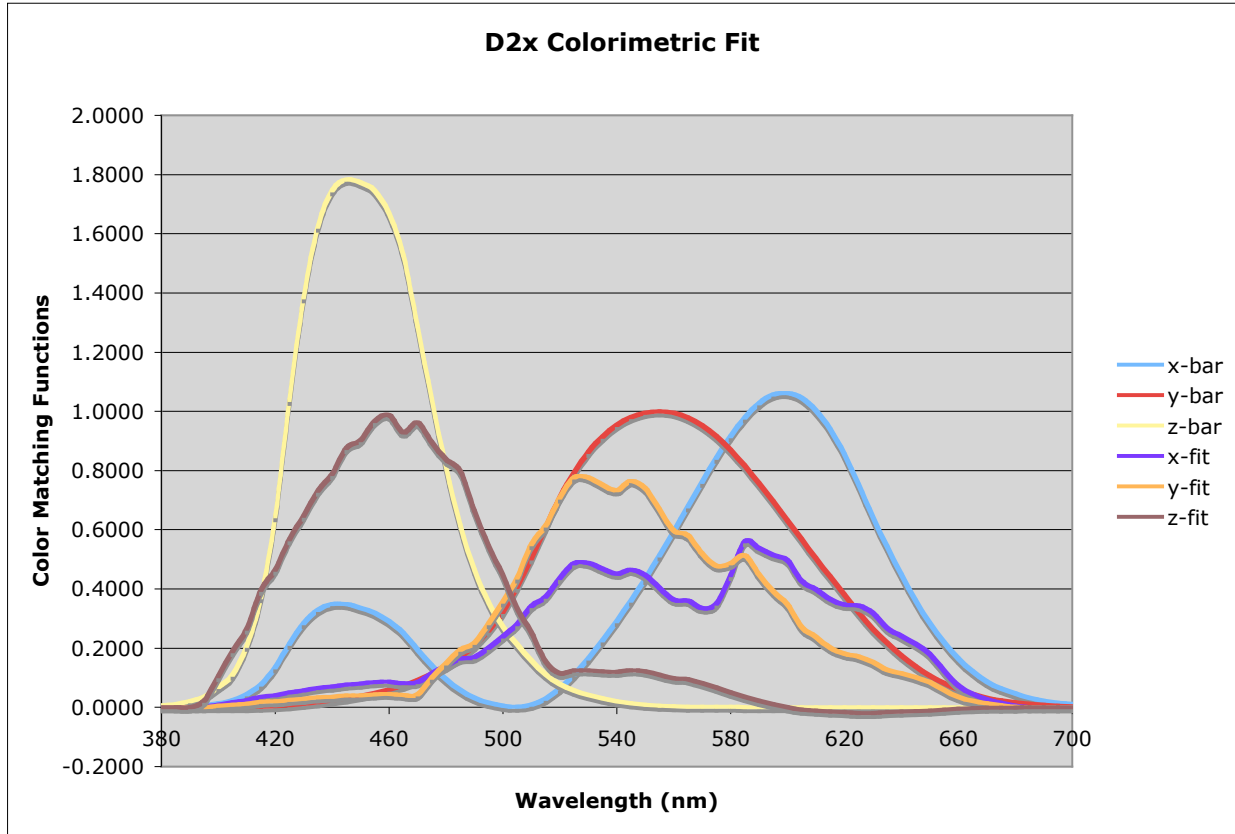
The CIE ΔE^*_{ab} summary (for the fitted 25 patches) is ...

	ΔE^*_{ab}
Mean	2.5
Std. Dev.	1.5
Max.	5.5
Min.	0.0

A plot of the fit in XYZ is ...



If spectral estimated CIE 1931 CMFs are derived from the measured D2x spectral responsivities and this chart-derived matrix, the result (not renormalized) is ...



Nikon D2x Characterization from Spectral Responsivity Measurements

Fit 3x3 with no intercept from spectral responsivities to CIE 1931 CMFs.

The normalized fit is ...

$$\begin{matrix} X \\ Y \\ Z \end{matrix} = \begin{matrix} | & 0.9856 & 0.3125 & 0.2302 \\ | & 0.4253 & 0.9722 & 0 \\ | & 0 & 0 & 1.530 \end{matrix} \begin{matrix} R \\ G \\ B \end{matrix}$$

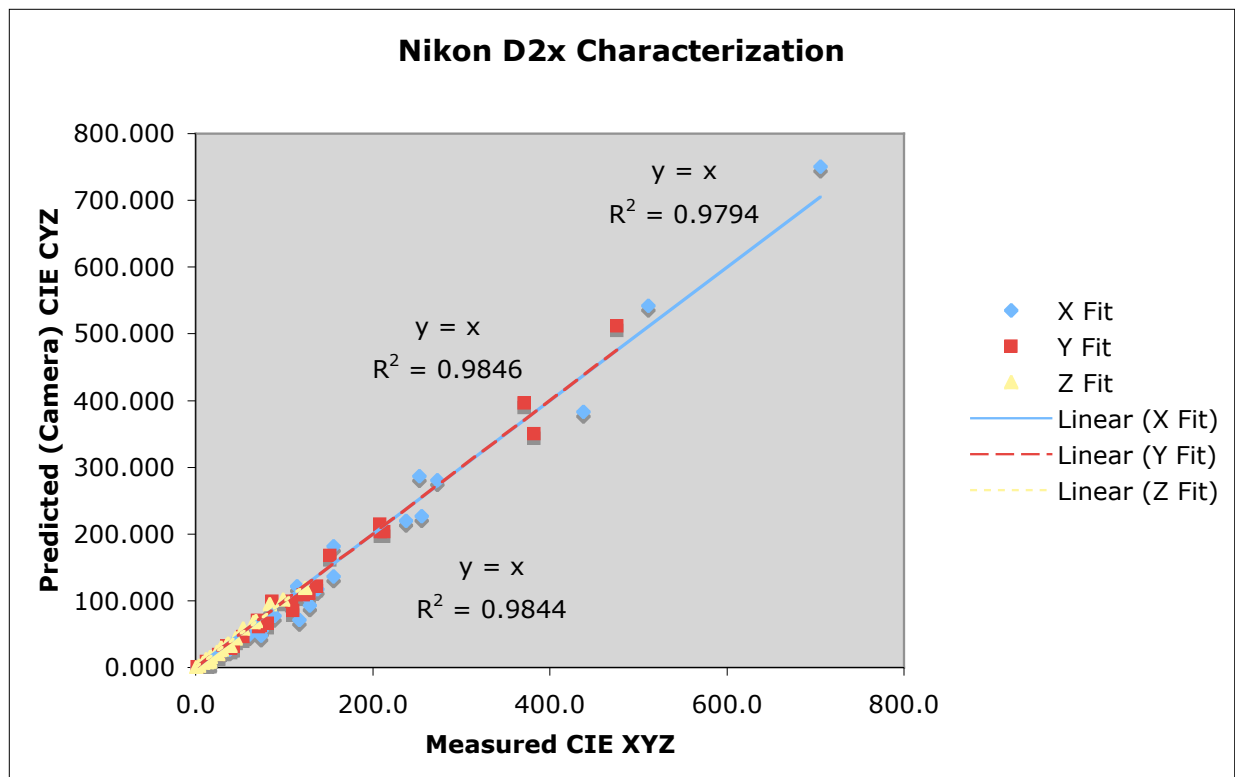
The R² values for XYZ are (0.77, 0.93, 0.88) respectively.

For the HDR color checker scene the normalization factors to get to absolute luminance are 7.68/1.5307, 7.68/1.5361, and 7.68/3.6119.

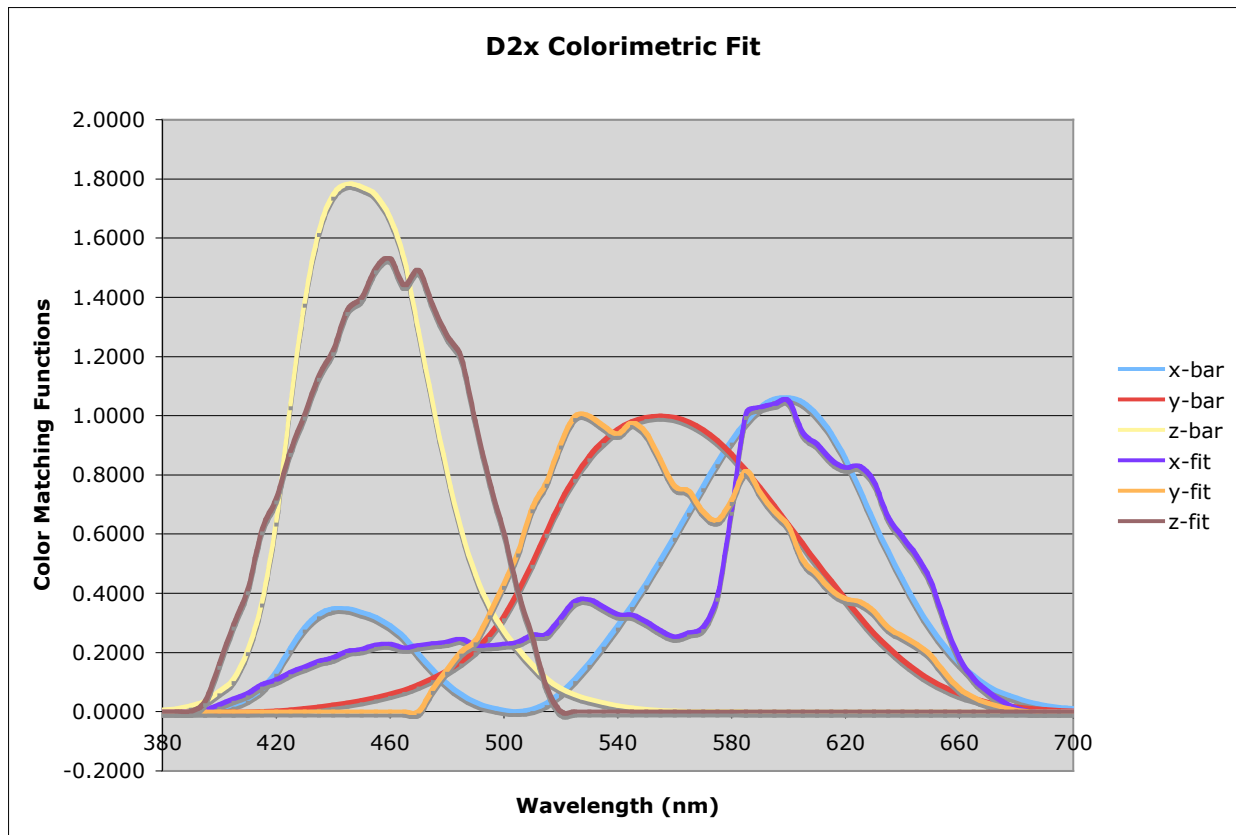
The CIE ΔE^*_{ab} summary (for the 25 patches) is ...

	ΔE^*_{ab}
Mean	11.4
Std. Dev.	8.6
Max.	34.3
Min.	0.0

A plot of the predictions in XYZ is ...



A plot of the CIE 1931 CMFs and the transformed D2x responsivities is ...



A plot of the raw D2x spectral responsivities (from NEFs read in through Photoshop with a Daylight balance (5500K)) and then three 1D LUTs applied (to undo the Photoshop “gamma correction”)

