

1 Color difference calculation

Normalized Yellow : (0, 1, 1) in BGR space

$$\begin{aligned}X &= 0.412453 * 1 + 0.377580 * 1 = 0.790033 \\Y &= 0.212671 * 1 + 0.715160 * 1 = 0.927831 \\Z &= 0.019334 * 1 + 0.119193 * 1 = 0.138527 \\X &= X/X_n = 0.790033/0.950456 = 0.831214 \\Z &= Z/Z_n = 0.138527/1.088754 = 0.127234\end{aligned}\tag{1}$$

$$\begin{aligned}L &= 116 * (0.927831)^{1/3} - 16 = 97.139507 \\a^* &= 500 * [0.790033^{1/3} - 0.927831^{1/3}] = -25.447079 \\b^* &= 200 * [0.927831^{1/3} - 0.138527^{1/3}] = 97.583734\end{aligned}\tag{2}$$

Normalized Blue : (1, 0, 0) in BGR space

$$\begin{aligned}X &= 0.180423 * 1 = 0.180423 \\Y &= 0.072169 * 1 = 0.072169 \\Z &= 0.950227 * 1 = 0.950227 \\X &= X/X_n = 0.180423/0.950456 = 0.189827 \\Z &= Z/Z_n = 0.950227/1.088754 = 0.872765\end{aligned}\tag{3}$$

$$\begin{aligned}L &= 116 * (0.072169)^{1/3} - 16 = 32.295672 \\a^* &= 500 * [0.189827^{1/3} - 0.072169^{1/3}] = 79.185829 \\b^* &= 200 * [0.072169^{1/3} - 0.872765^{1/3}] = -107.8617\end{aligned}\tag{4}$$

Yellow - Blue

$$\begin{aligned}\Delta L &= 97.139507 - 32.295672 = 64.843834 \\\Delta a^* &= -25.447079 - 79.185829 = -104.632908 \\\Delta b^* &= 97.583734 - (-107.8617) = 205.4447\end{aligned}\tag{5}$$

Blue - Yellow

$$\begin{aligned}\Delta L &= 32.295672 - 97.139507 = -64.843834 \\\Delta a^* &= 79.185829 + 25.447079 = 104.632908 \\\Delta b^* &= -107.8617 - 97.583734 = -205.4447\end{aligned}\tag{6}$$