Color Image Processing

- Three Primary Signals (R,G,B)
- A Color Palette of 256 Colors
- Representation of (R,G,B) Color Images
- RGB and HSI
- RGB and YIQ

Hue, Saturation, Intensity

$$
\begin{aligned}
I &= \tfrac{1}{3}(R+G+B) \\
S &= 1 - \tfrac{min\{R,G,B\}}{I} \\
H &= \theta \quad if \quad B \leq G \\
&\quad\; 2\pi - \theta \quad if \quad B > G
\end{aligned}
$$

where

$$
\theta = cos^{-1}\left[\frac{0.5[(R-G)+(R-B)]}{\sqrt{(R-G)^2+(R-G)(G-B)]}}\right]
$$

YIQ (Luminance and Chrominance)

$$
\begin{bmatrix} Y \\ I \\ Q \end{bmatrix} = \begin{bmatrix} 0.299 & 0.587 & 0.114 \\ 0.596 & -0.275 & -0.321 \\ 0.212 & -0.523 & 0.312 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}
$$