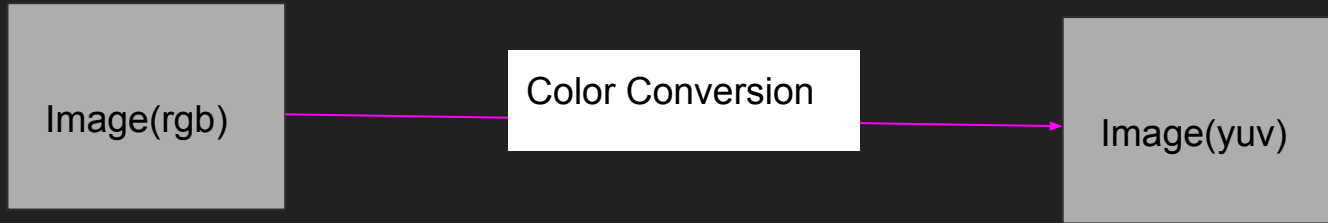


# Image colorization

# Approach

Convert the bitmap image into yuv color space

Because same in intensity values should have same color in a nearby region



Now apply the following optimization in U,V color space -

$$J(U) = \sum_{\mathbf{r}} \left( U(\mathbf{r}) - \sum_{\mathbf{s} \in N(\mathbf{r})} w_{\mathbf{rs}} U(\mathbf{s}) \right)^2$$

The weight vector depends on the intensity values as -

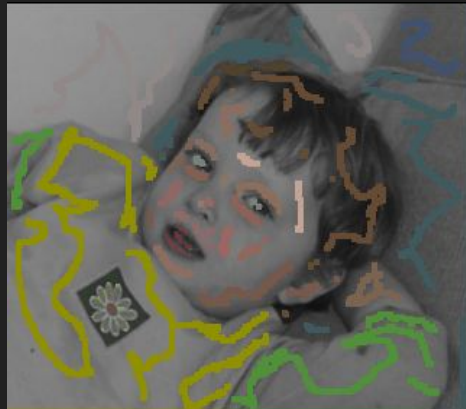
$$w_{\mathbf{rs}} \propto e^{-(Y(\mathbf{r}) - Y(\mathbf{s}))^2 / 2\sigma_r^2}$$

Since same intensity value should have same color value and edge should have different colors, the colors can be assigned as-

$U(\mathbf{r}) = a_i \cdot Y(\mathbf{r}) + b_i$  , where  $a_i$  and  $b_i$  same for all pixels in a small matrix around  $\mathbf{r}$  .

# Results

Input Images



Output

