Supplementary Material

After ignoring high order terms of ϵ_n, the equation (17) becomes

$$\mathrm{E}(\beta) = \sum_{n=1}^{N} \left(y_n - f_\beta^*(f_w^{-1}(y_n) + \epsilon_n)\right)^2$$

$$\approx \sum_{n=1}^{N} \left(y_n - f_\beta^*\left(f_w^{-1}(y_n)\right)\right)^2 + \sum_{n=1}^{N} \epsilon_n(\beta_1 + 2\beta_2 f + 3\beta_3 f^2 + \beta_4 + 2\beta_5 f + \cdots)$$

where $f = f_w^{-1}(y_n)$. Since ϵ is proportional to Δ and $\sum_{c \in S_{cls}} \Delta_{c,cls} = 0$, the approximation of (18) is more accurate when the sum of the deviations in an image,

$$\sum_{cls} \sum_{c \in I_{cls}} \Delta_{c,cls}$$

, is close to zero, leading the extra term of ϵ_n also zero. When it is not, our method transfers the characteristics of Δ to the new input. Then the result looks more like color transfer.