Figure 1: The performance of the proposed MSS model on a generic test image. The model may well simulate how a typical artist creates a painting \( u_0 \): first sketch the outlines \( \Gamma \) (upper right), followed by filling in the cartoonish overall shades \( u \) for each structure (lower left), and finally elaborate the detailed textures \( v \) (lower right) to bring complexion and life to the entire scene \( u_0 \).

where the “wave numbers” \( k_- \) and \( k_+ \) are positive integers, and satisfy (see Fig. 3)

\[
\begin{align*}
  k_- &\gg k_+ \gg 1. \quad (18)
\end{align*}
\]

Treat such an image as a pure texture distribution \( v \). To human vision, it is natural to identify \( x = 0 \) as a boundary or edge point. We now investigate the quantitative effect of introducing \( \Gamma = \{0\} \) as an edge point.

First assume that \( \Gamma = \{0\} \) is indeed acknowledged as an edge point. Then \( v = u_0 \) is segmented into two components \( v_{\pm} \) on each \( \Omega_{\pm} \). Let \( \Phi_{\pm} \) denote the corresponding texture potentials. Then one must have

\[
-\Phi_{\pm}''(x) = v_{\pm}, \quad \Phi_{\pm}(z) = 0, \quad z \in \partial \Omega_{\pm},
\]

where \( \pm \)'s must be uniformly + or -. Therefore, we have

\[
\Phi_{\pm} = \frac{\sin(k_{\pm}x)}{k_{\pm}^2},
\]

and

\[
\|v\|^2_{H^{-1}(\Omega, \Gamma)} = \int_{-\pi}^{0} \Phi_{\pm}'(x)^2 \, dx + \int_{-\pi}^{\pi} \Phi_{\pm}'(x)^2 \, dx = \frac{\pi}{2} \left( \frac{1}{k_-^2} + \frac{1}{k_+^2} \right) = \frac{1}{8\pi} (\lambda_-^2 + \lambda_+^2), \quad (19)
\]