Combining Sketch and Tone for Pencil Drawing Production

Reporter : Fu Yuqian

Student ID : 2018302120169

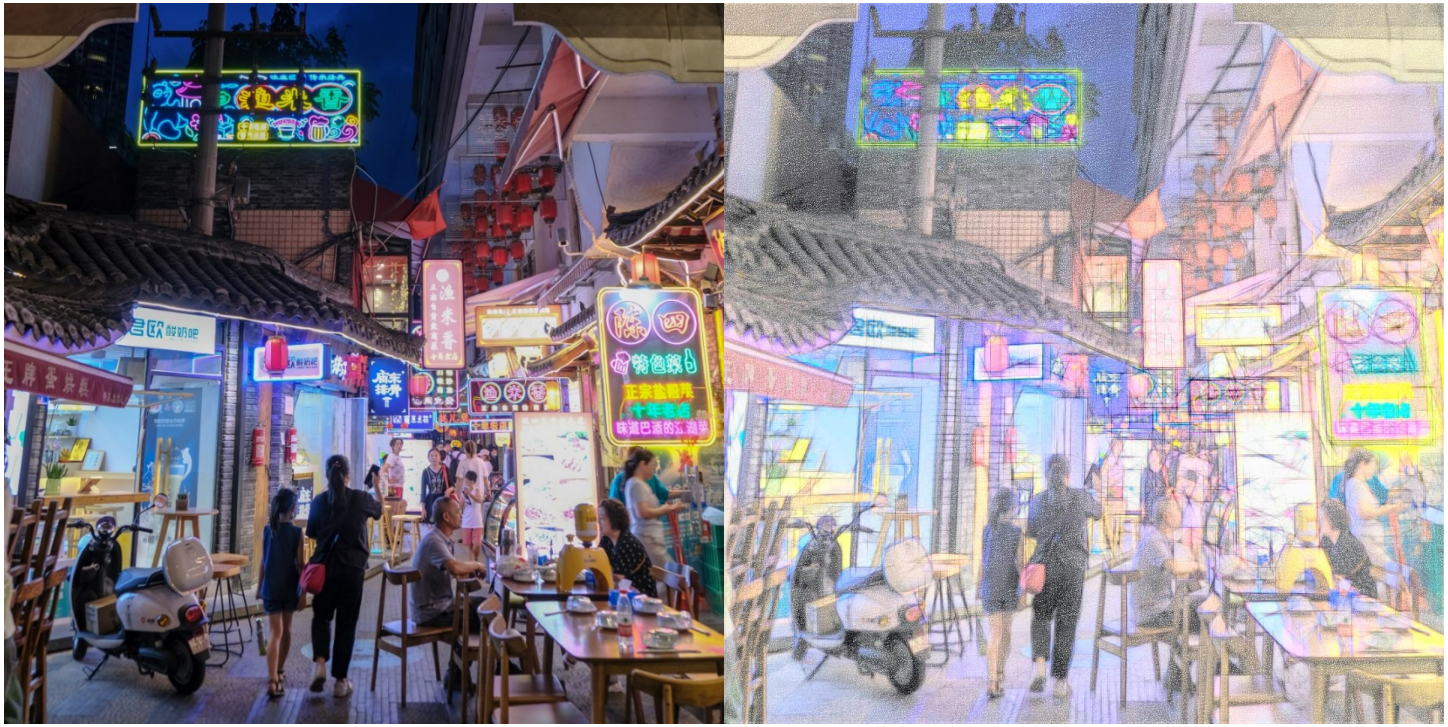
Professor : Professor Bu.

Major : Electronic Engineering

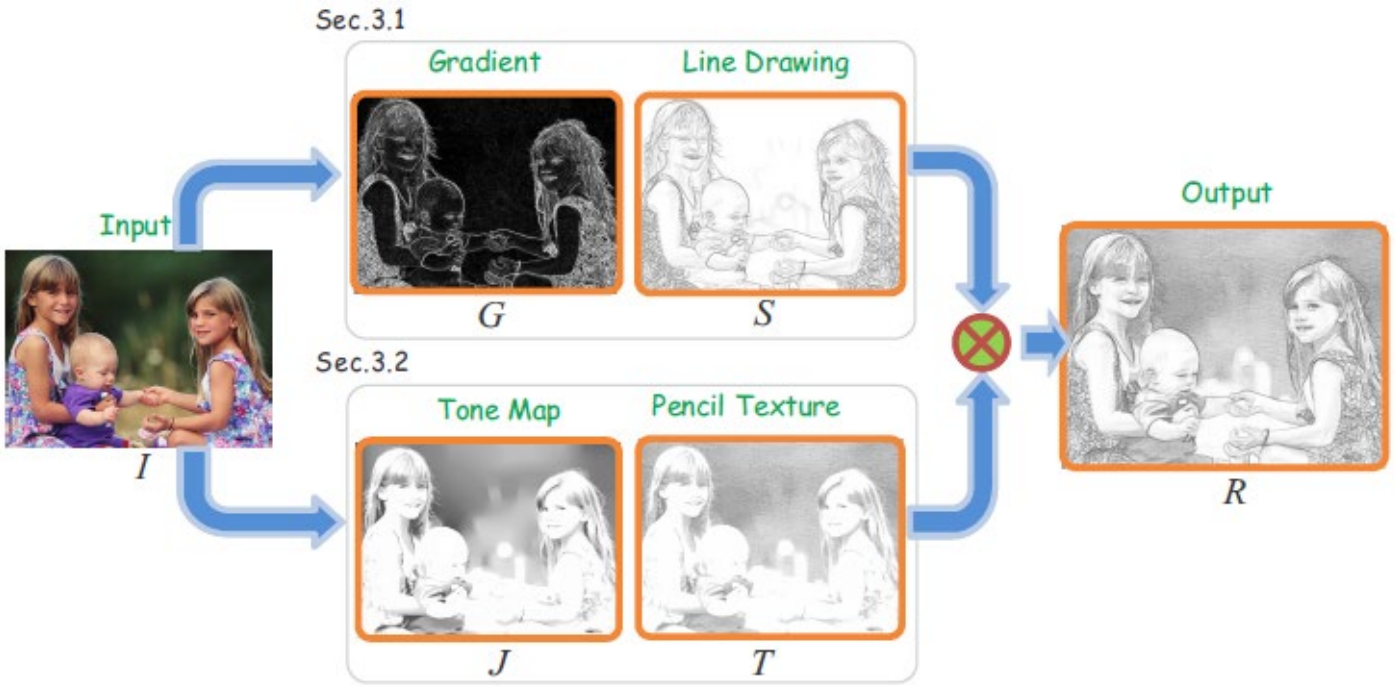
Outline

- Background
- Overall Framework
- Line Drawing with Strokes
- Tone Drawing
- Color Pencil Drawing
- Results

Background



Overall Framework

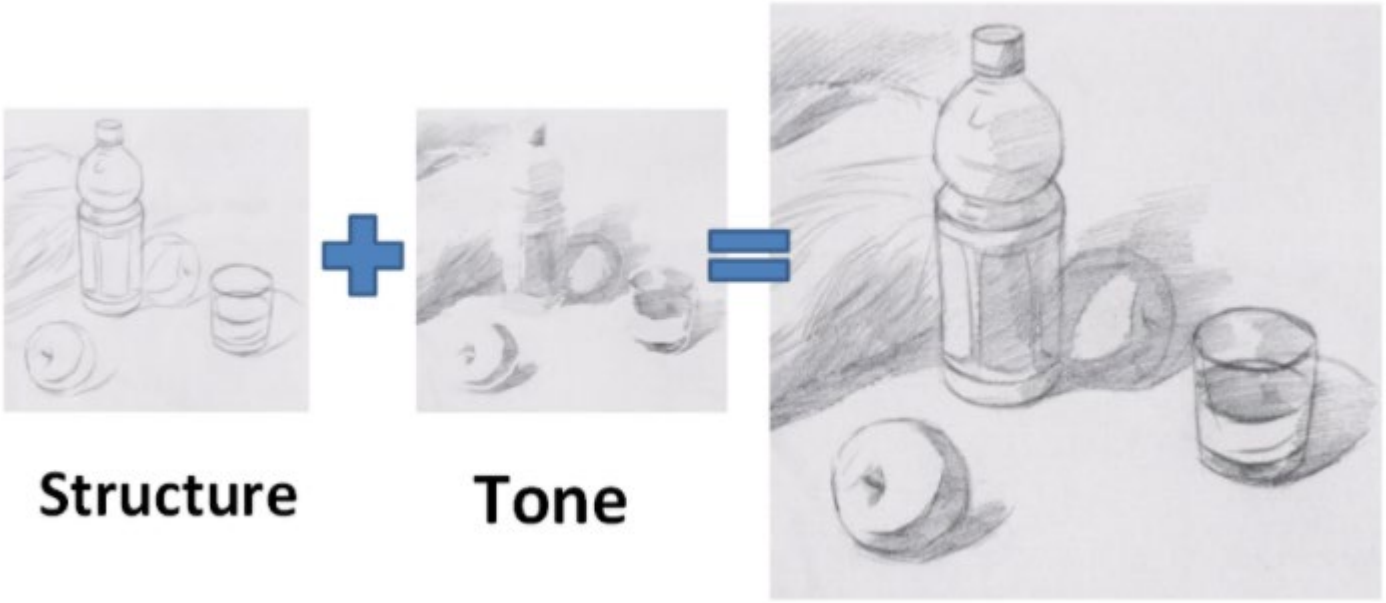


$$R = S \cdot T.$$

Line Drawing with Strokes

Purpose : expressing general structures of the scene

In the literature, pencil drawing can be classified into a few styles.Sketch typically refers to a quickly finished work without a lot of details. Artists often use sketches to depict the global shape and main contours. Hatching, on the other hand, is used to depict tone or shading by drawing dark and parallel strokes in different regions.


Structure
Tone

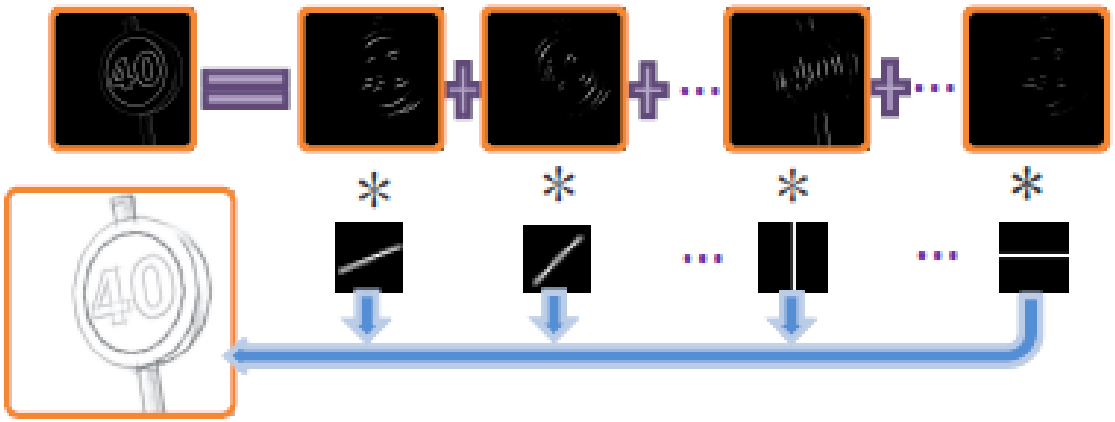
Classification

The gradient maps

$$G = \left((\partial_x I)^2 + (\partial_y I)^2 \right)^{\frac{1}{2}}$$

typically noisy and do not contain continuous edges immediately ready for stroke generation

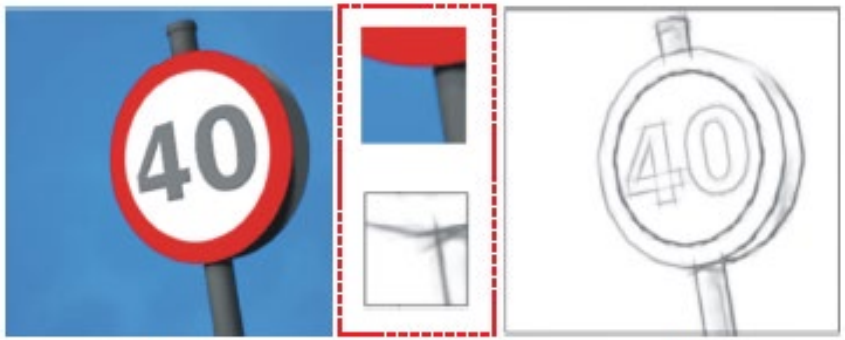
New step



Motion blur

Line Shaping

$$S' = \sum_{i=1}^{8} (\mathscr{L}_i \otimes C_i)$$



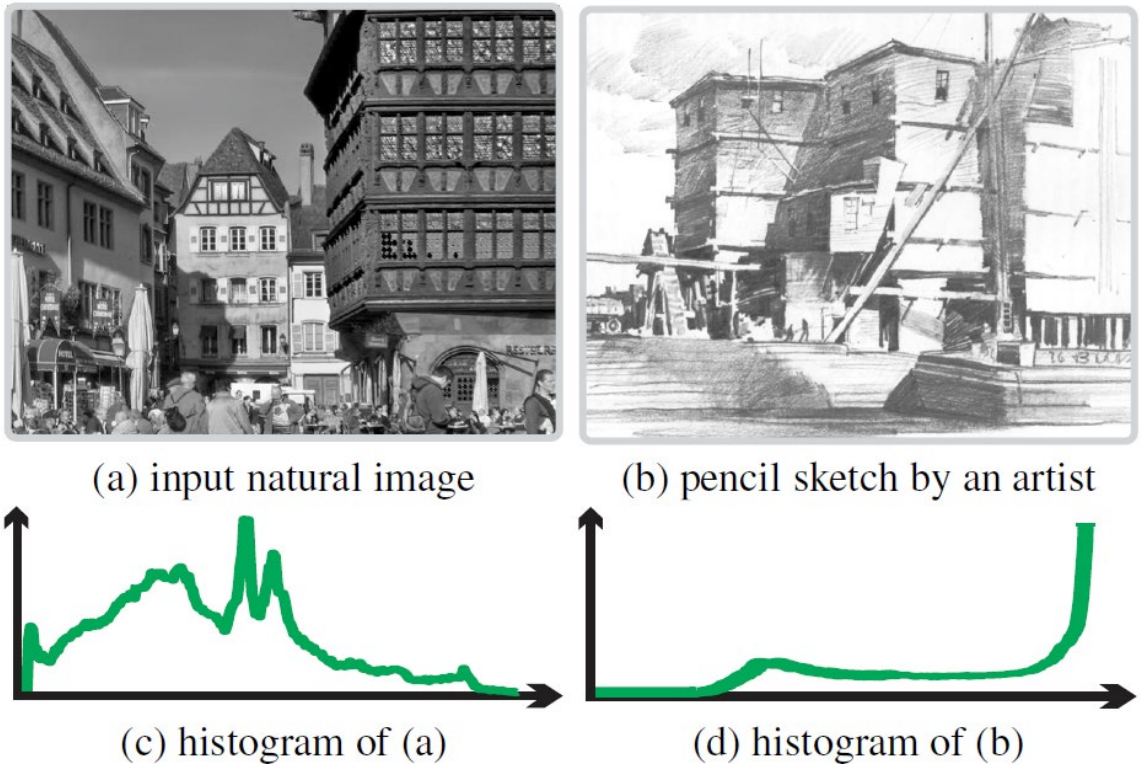
S’->normalization->S

Tone Drawing

Purpose :focuses more on shapes, shadow, and shading than on the use of lines

Model-based Tone Transfer

For many cases, is not optimal because the tone distribution of a grayscale image generally differs significantly from that of pencil sketch.



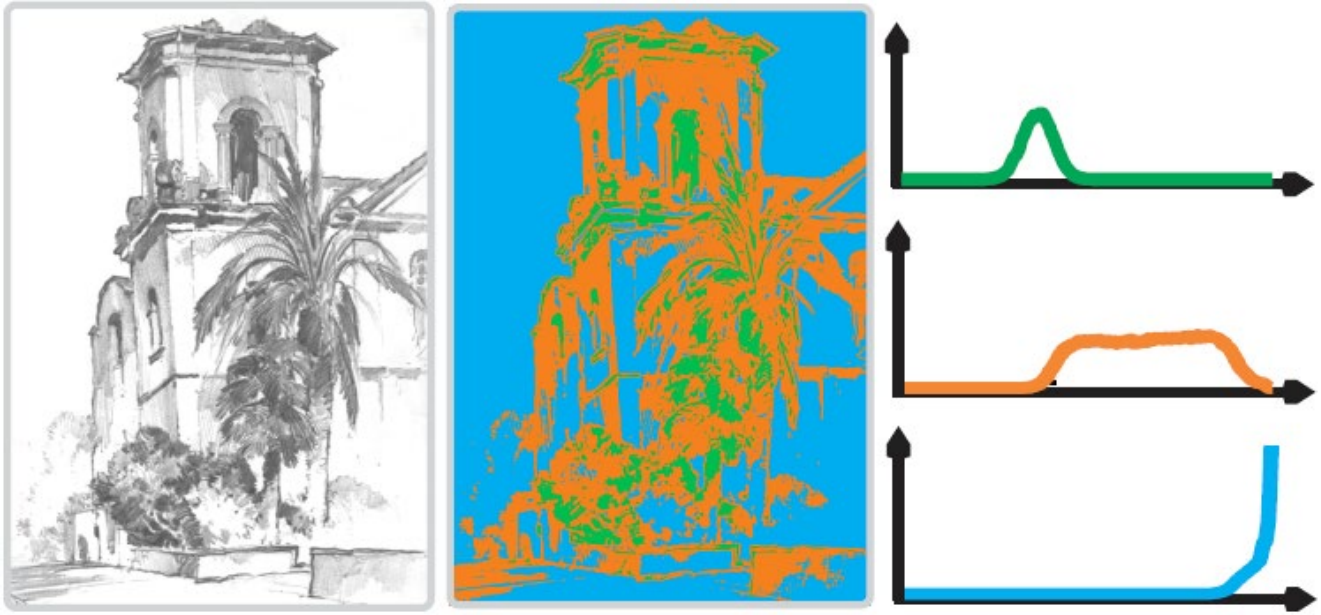
(a) input natural image

(b) pencil sketch by an artist

(c) histogram of (a)

(d) histogram of (b)

Given an artist-drawn pencil sketch shown in (a), we partition pixels into three layer, according to their values (details are given later when discussing parameter learning). They are highlighted in green, orange, and blue in (b). (c) gives the tone distributions of the three layers, in accordance with our observation.



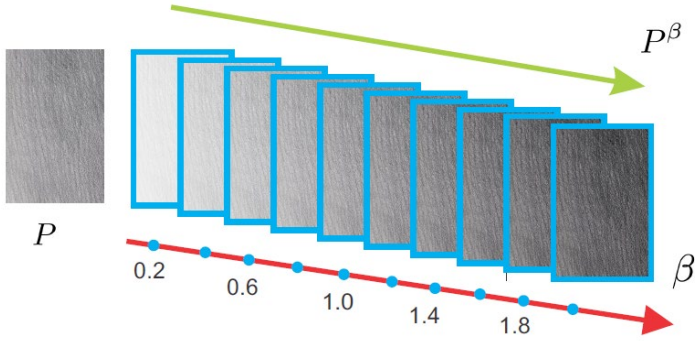
(a) (b) (c)

$$p(v) = \frac{1}{Z}\sum_{i=1}^{3}\omega_i p_i(v)$$

Parameter Learning

$w1$	$w2$	$w3$	σ_b	u_a	u_b	μ_d	σ_d
52	37	11	9	105	225	90	11

Pencil Texture Rendering

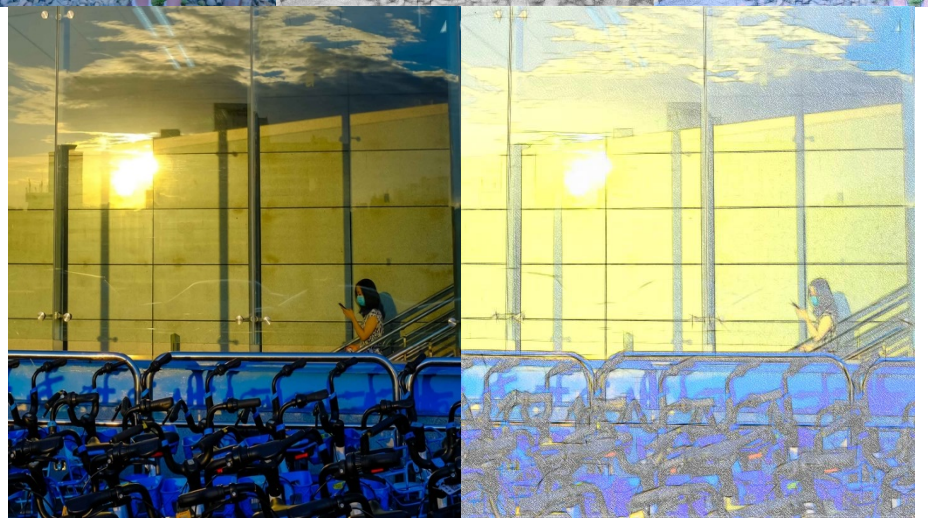


Generating suitable pencil textures for images is difficult. Tonal texture refers to pencil patterns without obvious direction, which reveal only the tone information.

Color Pencil Drawing

Take the generated grayscale pencil sketch R as the brightness layer, i.e., the Y channel in the YUV color space, and re-maping YUV back to the rgb space.

Results



Thanks!

Reporter : Fu Yuqian

Student ID : 2018302120169

Professor : Professor Bu.

Major : Electronic Engineering