Introduction

Vector images are important to graphic design, 2D animation and 3D printing; flexible editing in comparison with raster images.

But manually creating vector line art is costly.

Contributions

A general framework for vector line drawing generation that works with a wide variety of images; not requiring vector images for training.

Model a virtual pen using a dynamic window while drawing lines; allows processing images of arbitrary resolution.

Stroke regularization mechanism that controls the simplicity of the output vector images.

https://github.com/MarkMoHR/virtual_sketching

Method

Raster Input and Vector Output

• Learns a raster image to vector stroke parameters mapping directly.

• Dependent only on raster training data because of a differentiable rendering module.

Dynamic Window Mechanism

• To work on arbitrary resolution, we propose modeling a virtual pen using a dynamic window, which draws stroke on the canvas.

• Using aligned cropping and differentiable pasting.

Four Main Modules

• Cropping: patches from input image and canvas are cropped based on the window.

• Stroke Generation: based on the patches, the stroke generator produces the vector parameters.

• Rendering: stroke parameters are approximated into a stroke image by differentiable rendering.

• Pastling: the stroke image is pasted to the last canvas based on the window.

Recurrent Drawing

• Draws the next stroke based on the previous canvas in a recurrent manner.

Results

Basic Functions

• Moves around by scaling the window and sliding to an undrawn area for restarting the drawing.

• Able to enlarge the window and draw long strokes for simplicity (stroke regularization mechanism).

Clean Line Drawing Vectorization

• Our model works better on both completeness and details in less computation time.

• Our model produces comparable simplified results of vector format in a single step.

Photograph to Line Drawing

• Our model generates comparable facial sketches.

Limitations and Discussion

• “missing lines” in some highly complicated cases

• alternative encoding methods (e.g., pyramid views) with the global guidance

• Difficult to generalize well on complex rough sketches or photographs and may produce artifacts

• combining the pixel-level models and our approach in a single end-to-end model

• Perform less than satisfactory in some types of junctions (not intended for recovery of topology)

• pre-defined principles as prior or constraint information can be incorporated

References