Shape Processing and its Application to Stroke Rendering and Stylization

An automated inking system

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"An automated inking system"

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This project aims to develop a stylization system that generates ink work from plain curves that can match the quality of those drawn by artists. We state the importance of stroke interactions and propose a novel data-driven model that can capture the art of inking. We address the existing limitations and present a stack of shape processing algorithms used to construct the automated inking system. Our system is able to generate plausible inking of Chinese calligraphy and cartoons at a quality level not reached before.
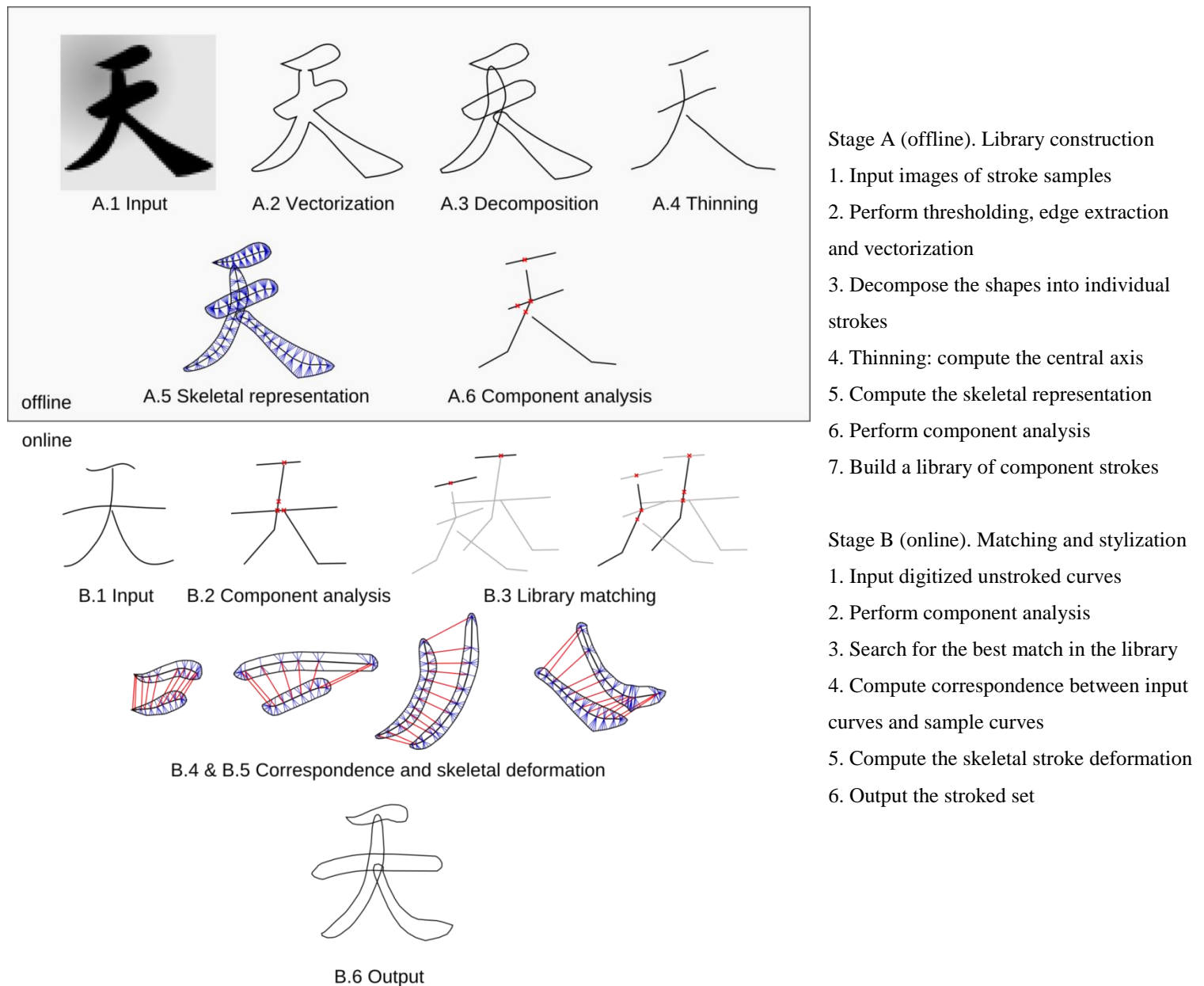

Stage A (offline). Library construction
1. Input images of stroke samples
2. Perform thresholding, edge extraction and vectorization
3. Decompose the shapes into individual strokes
4. Thinning: compute the central axis
5. Compute the skeletal representation
6. Perform component analysis
7. Build a library of component strokes

Stage B (online). Matching and stylization
1. Input digitized unstroked curves
2. Perform component analysis
3. Search for the best match in the library
4. Compute correspondence between input curves and sample curves
5. Compute the skeletal stroke deformation
6. Output the stroked set
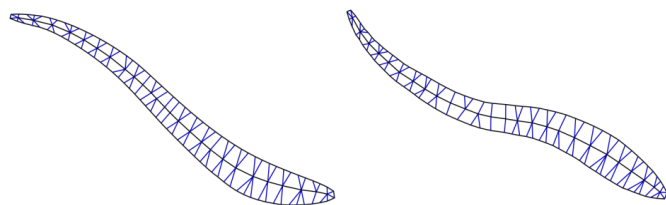
Figure 1. Visual summary of the automated inking system

Figure 2. Skeletal stroke representations (left); deformation (right).
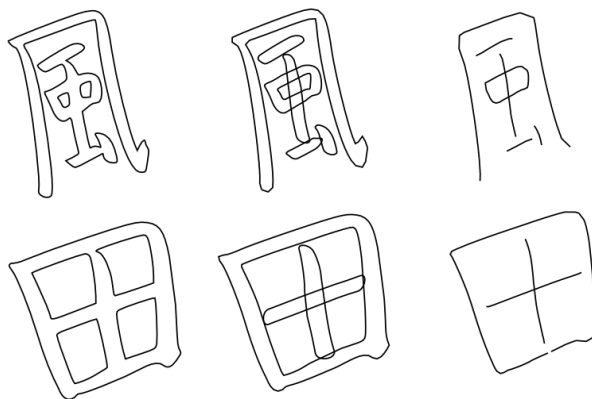
Figure 3. Decomposition and thinning of 2 hollow shapes

Figure 4. Cartoon stroke library. Artwork courtesy
AnarchyWulf, reproduced without permission.
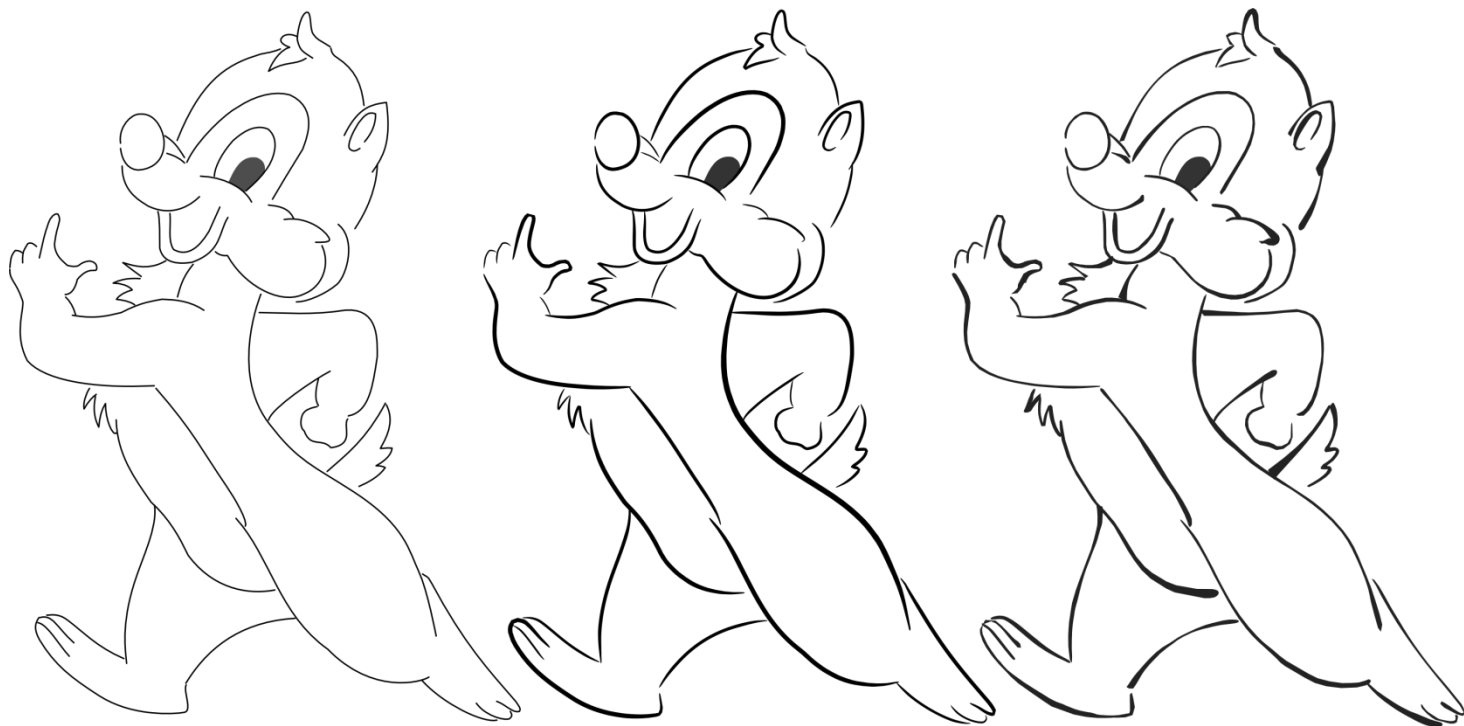

Figure 5. Input (left), basic stylization (middle), cartoon-stylized result (right). The solid eyes were added afterwards for aesthetic purpose.
It was originally a frame extracted from the animation *Toy Tinkers*, 1949 by Walt Disney Productions. Reproduced without permission.
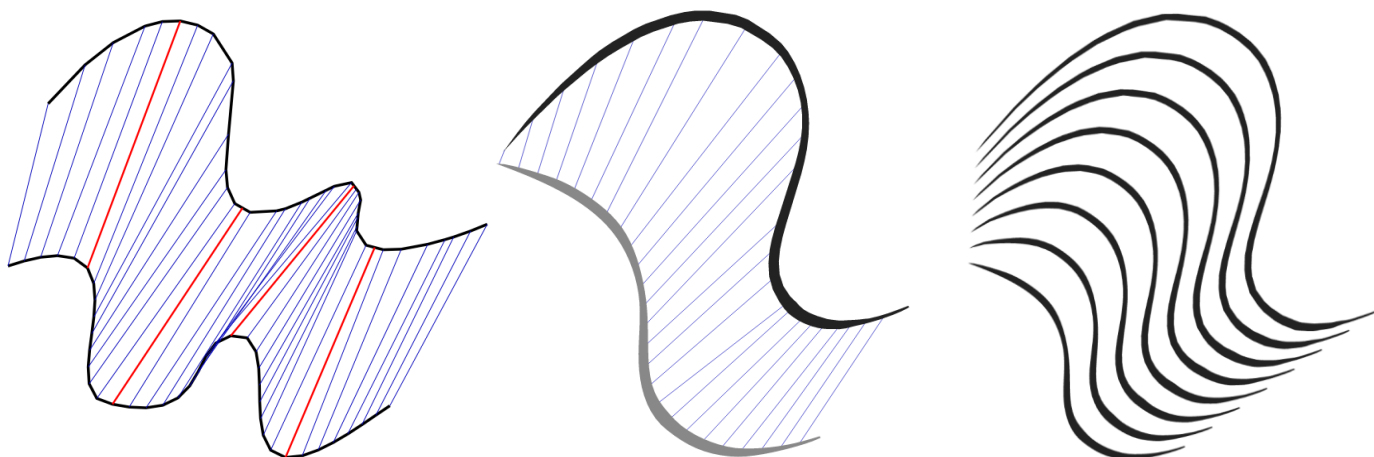

Figure 6. Curve correspondence (left), stroke transfer (center), stroke interpolation (right)
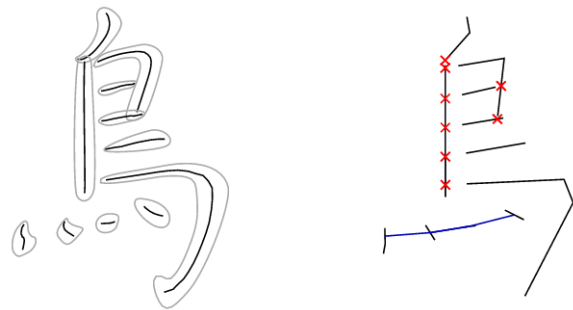
Figure 7. Component profile. Stroke and path (left), characteristic polyline (right).
Intersections are marked as red crosses and dot proximities in blue lines.
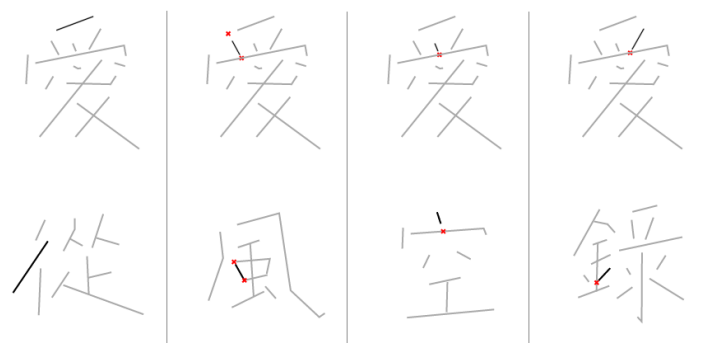
Figure 8. Stroke library of Chinese calligraphy (left); Component matching (right)

Figure 9. Input curves

Figure 10. Stylization result