Paper Presentation

WYSIWYG NPR: Drawing Strokes Directly on 3D Models

Qinglei Meng
Yuman Huang
Christian Graf

University of Auckland – Computer Science Department
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What is non-photorealistic rendering

Why non-photorealistic rendering?

- **Many advantages depend on the purpose**
  - Not depicting every details
  - Animation focus on the relevant actions and elements
  - Can quickly get big picture.
  - Less time and storage space.
  - Real time rendering algorithm.
- **The application of areas**
  - Scientific visualization
  - Emulation of traditional artistic media
  - The creation of cartoons

The Authors' work

Addresses interactive rendering

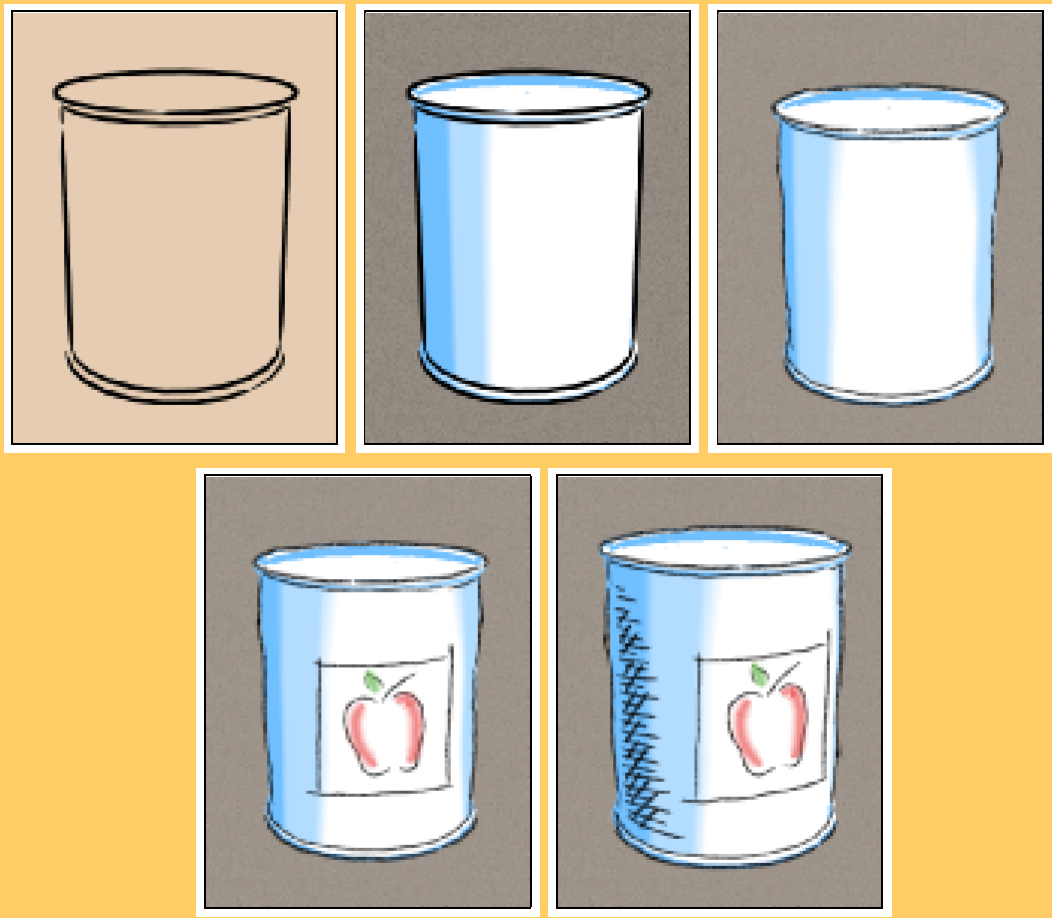
Maintains temporal coherence

Innovations

Drawing the artist's way

Animated NPR Graphics

An Interaction Example



Rendering Basics

- Procedural textures (‘shaders’) on triangle meshes
  - Background & base coat

    (i.e. cartoon style)
  - Strokes

    (i.e. silhouette)
  - Media simulation

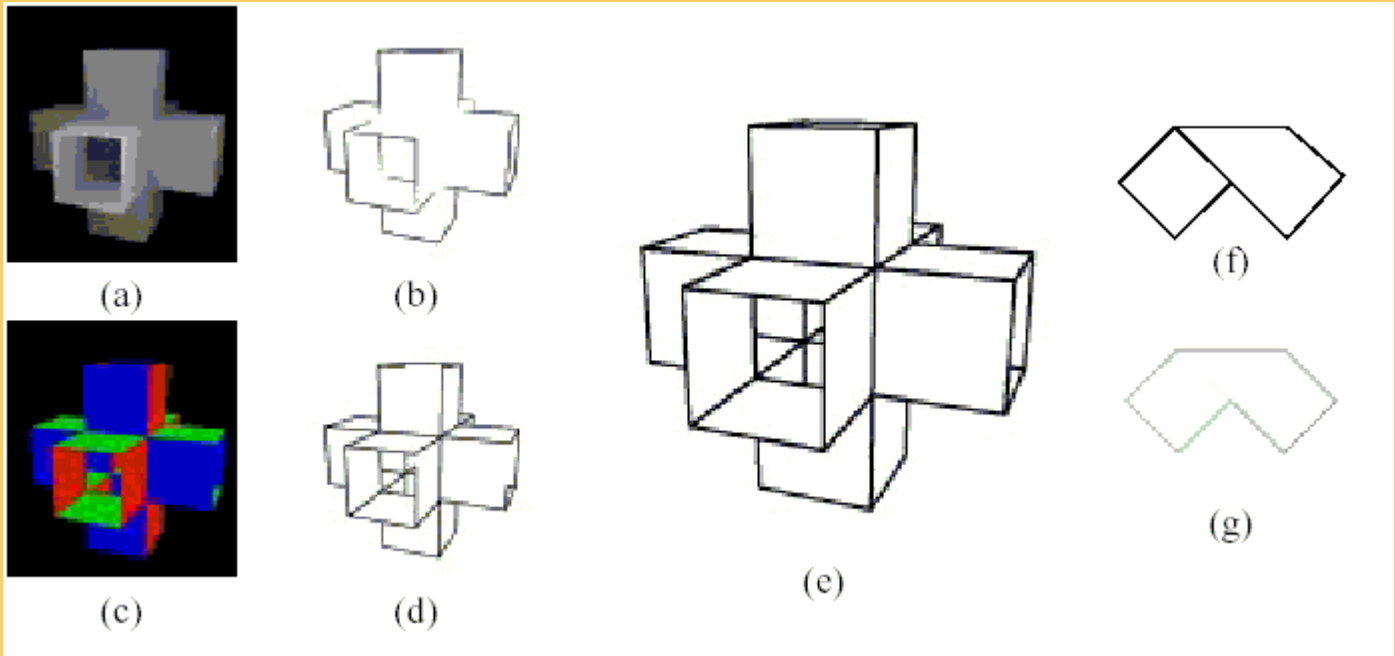
Stroke-based rendering algorithm, three categories

- Silhouette and crease lines that form the basis of sample line drawings
- Decal strokes that suggest surface features
- Hatching strokes to convey lighting and tone

Silhouettes

- A representation of an object by showing the outline only
- Primarily focus on detecting outlines of object shape: silhouettes, boundaries and crease

A very simple way



(a)depth map (b)edges of depth map (c) normal map
(d)edges of normal map (e)the combined edge map
(f) a difficult case: folded piece of paper (g) depth edges

Methods in finding silhouettes of models in 3D

For polygonal meshes:

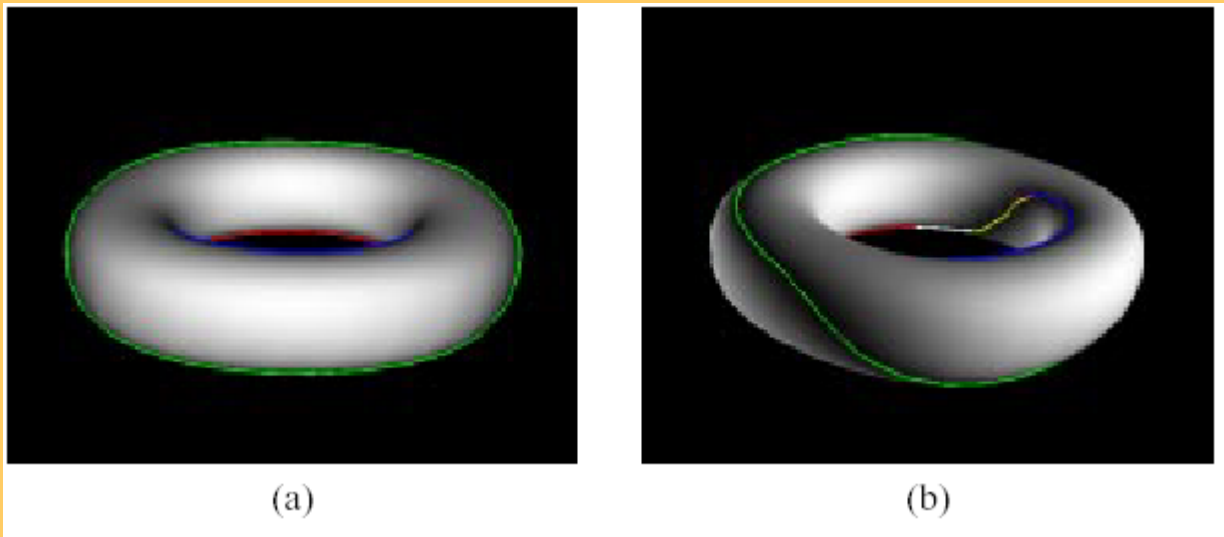
edges that connect invisible (back-facing) polygons to possibly visible (front-facing) ones

For a surfaces:

$$n \bullet (x - C) = 0$$

x point n normal C camera center

Changes in visibility



(a) Silhouette of a smooth surface

(b) Side view of the silhouette

Fast silhouette Detection

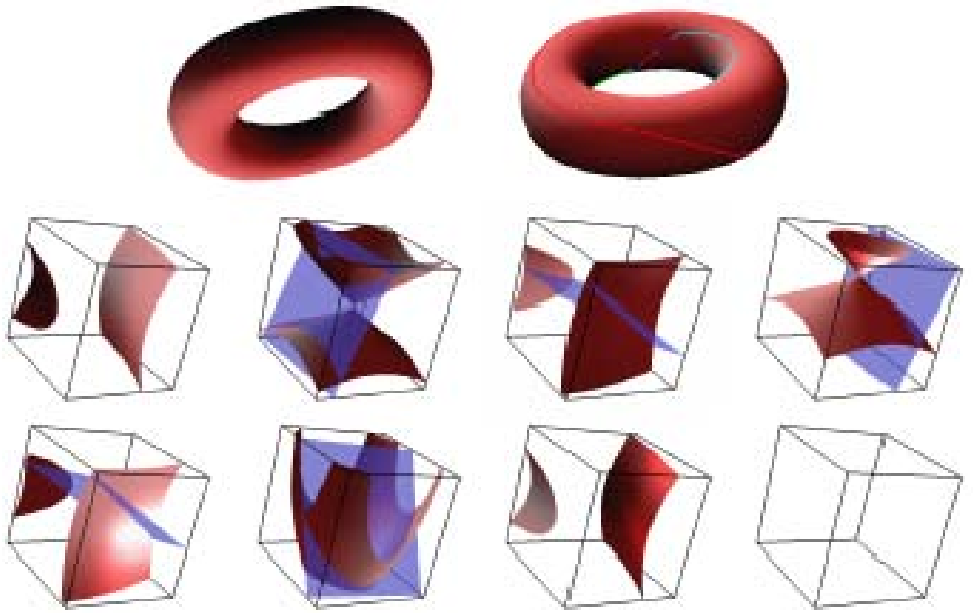


Figure 7: Silhouette lines under the duality map correspond to the intersection curve of a plane with the dual surface. *Top:* Torus shown from camera and side views. *Bottom:* The eight 3D faces of the hypercube, seven of which contain portions of the dual surface. The viewpoint dual is shown as a blue plane. Silhouettes occur at the intersection of the dual plane with the dual surface.

The authors' work

- Adapt the silhouette detection algorithm Markosian et al [1997]
- Adapt Hertzmann & Zorin [2000] alternate definition and their fast silhouette detection
- Adapt the stochastic algorithm [Markosian et al]

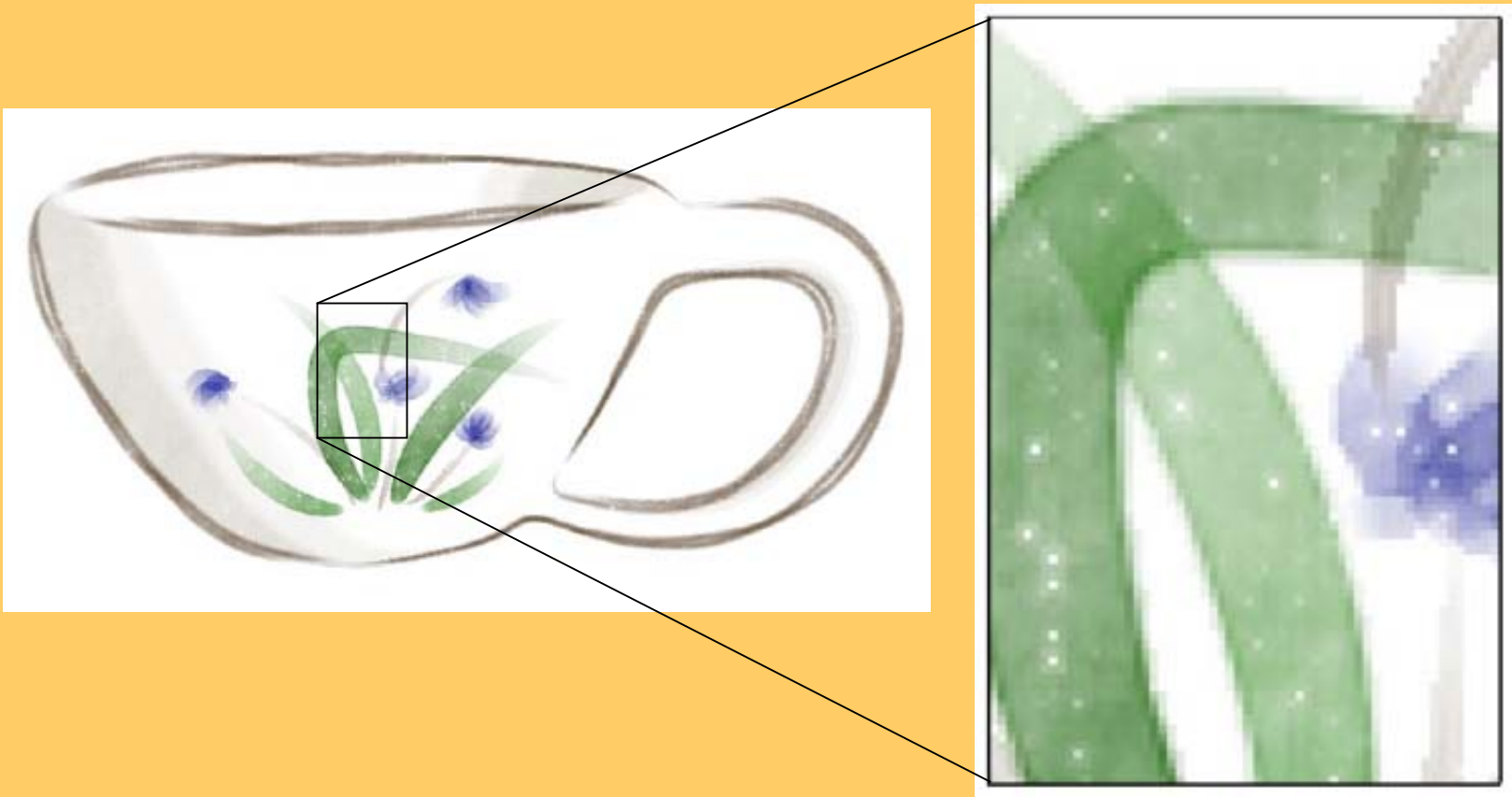
➢ Render silhouette with stylization

➢ Assigning them consistent parameterization is critical for temporal coherence

Hatching

By Yuman

Media Simulation Example



Result Example

Results & Conclusion

- Strength of the system:
    - Degree of control given to the artist
    - Diversity of styles stroke
- Drawbacks:
    - Object interplay not supported
    - Short strokes don’t work well
- Stroke count with greatest influence on the performance

The End.

Thank your for your attention.

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