

CMSC 491A/691A Artistic Rendering

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Announcements

- Questions
- Pick papers
- Media collection due Thurs

Computer Depiction

- Fredo Durand, NPAR 2002
- Issues
 - Intrinsic vs extrinsic characteristics
 - Different for different artistic traditions
 - Primary vs secondary geometry
 - Local vs global consistency
 - Depiction as optimization
 - Parameters for solving optimization
 - Movement from 3D->2D and back

Computer Depiction (cont)

- Systems representation
 - Spatial
 - 3D->2D: Perspective, projection
 - 2D->2D: warping
 - 2D->3D: Camera control, modeling
 - Primitive
 - Continuous pts, discrete points, lines, regions
 - View independent vs view dependent
 - Attribute
 - 3D->2D: shading
 - 2D->3D: lit-sphere, 3D painting, shadows
 - Marks
 - Mostly 2D->2D
 - Coherence issues

Evaluating NPR: Eye Movement

- Santella and DeCarlo, NPAR 2004
- How to assess effects of abstraction and style?
 - Preference; Task performance
 - Eye movements

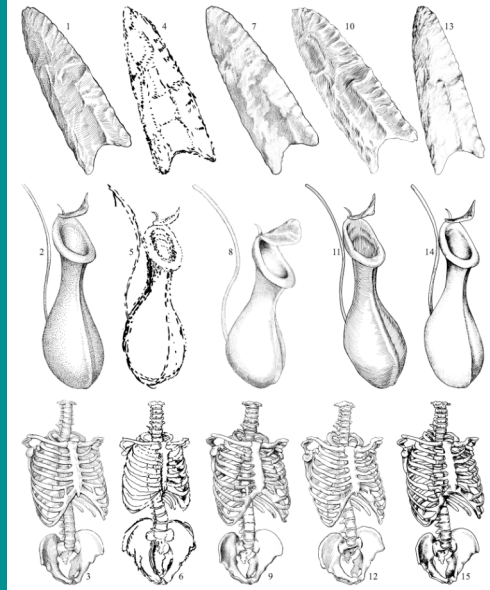


Evaluating NPR: Observation

- Isenberg, Neumann, Carpendale, Sousa, Jorge
NPAR06
- Qualitative aspects of renderings
- Subjects:
 - domain experts, professional illustrators, illustration end users, npr researchers
- Procedure
 - Pile sorting task
 - Semi-structured interviews about preference and utility
 - Questionnaire

Evaluating NPR: Observation (2)

- Clusters
 - Same artist
 - Same technique
 - Similar LOD
 - Mixtures



Evaluating NPR: Observation (3)

- Interviews
 - Which images do you particularly like?
 - Seemed to assume illustration task
 - As likely to be computer-generated
 - In what context would you use these images?
 - Which would you use in university textbooks?
 - Mostly computer-generated
 - Detailed, realistic, shading, texture, traditional style, good 3D
 - Which would you use for children's textbooks?
 - Which look most computer-generated/hand-drawn?
 - Hatching most likely to stand out as hand-drawn
 - Some computer-generated images stood out as hand-drawn
 - Sparseness and variation made an image more like hand-drawn

Artistic Image and Video Processing

- Process image or video input to have an artistic appearance
- Key issues:
 - Mimic style
 - Identify features



Impressionist Video

- Processing Images and Video for an Impressionist Effect, Litwinowicz, SIGGRAPH97
- Image process video streams to look “impressionist”
- Use in film “What Dreams May Come”
- Addresses problems:

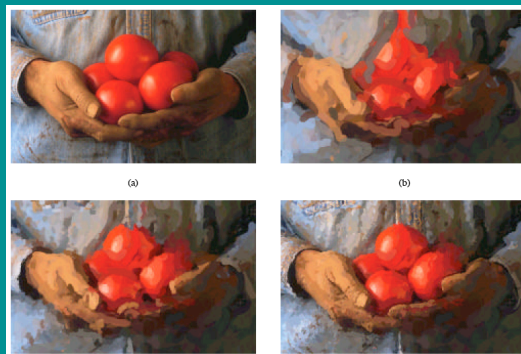
Impressionist Video (2)

- Process
 - Rendering strokes
 - Generate line w/length, thickness, orientation
 - Randomly perturb length, radius, color, theta
 - Clip to image edges and render
 - Orienting strokes
 - Orthogonal to color gradient
 - Maintaining coherence
 - Use optical flow to guide stroke movement
 - Fill in strokes when they get too sparse



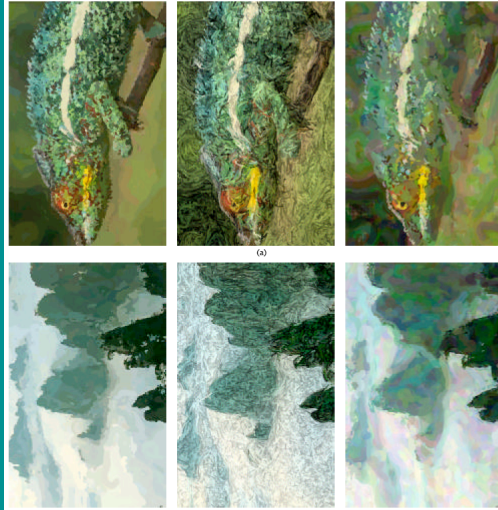
Curved Brushes

- Painterly Rendering with Curved Brushes of Multiple Sizes, Hertzmann, SIGGRAPH98
- Use more flexible brush strokes to create more expressive style
- Parameters
 - Variable brush size
 - Curve strokes



Curved Brushes

- Style parameters
 - Approximation threshold
 - Brush sizes
 - Curvature filter
 - Blur factor
 - Min/max stroke lengths
 - Opacity
 - Grid size
 - Color jitter
- Combinations
 - Impressionist
 - Expressionist
 - Colorist wash
 - Pointillist

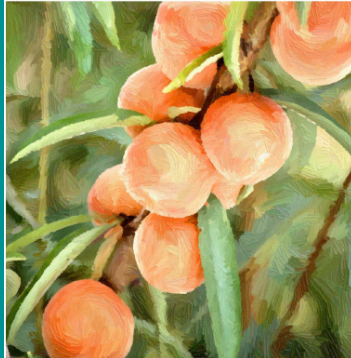


Painterly Animation

- Image and Video Based Painterly Animation, Hays and Essa, NPAR04
- Builds on Litwinowicz97, Hertzmann98, combining elements to make a more robust system
- Adds user specified motions, stroke height maps

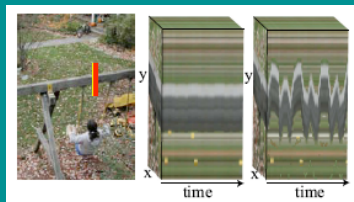


Painterly Animation (2)



Motion Magnification

- Motion Magnification, Liu, Torralba, Freeman, Durand, and Adelson, SIGGRAPH05
- Identify interesting motions and magnification
 - Register images
 - Cluster feature point trajectories
 - Segment motion into layers
 - Magnify motion of layer
 - Render



Motion Magnification (2)

