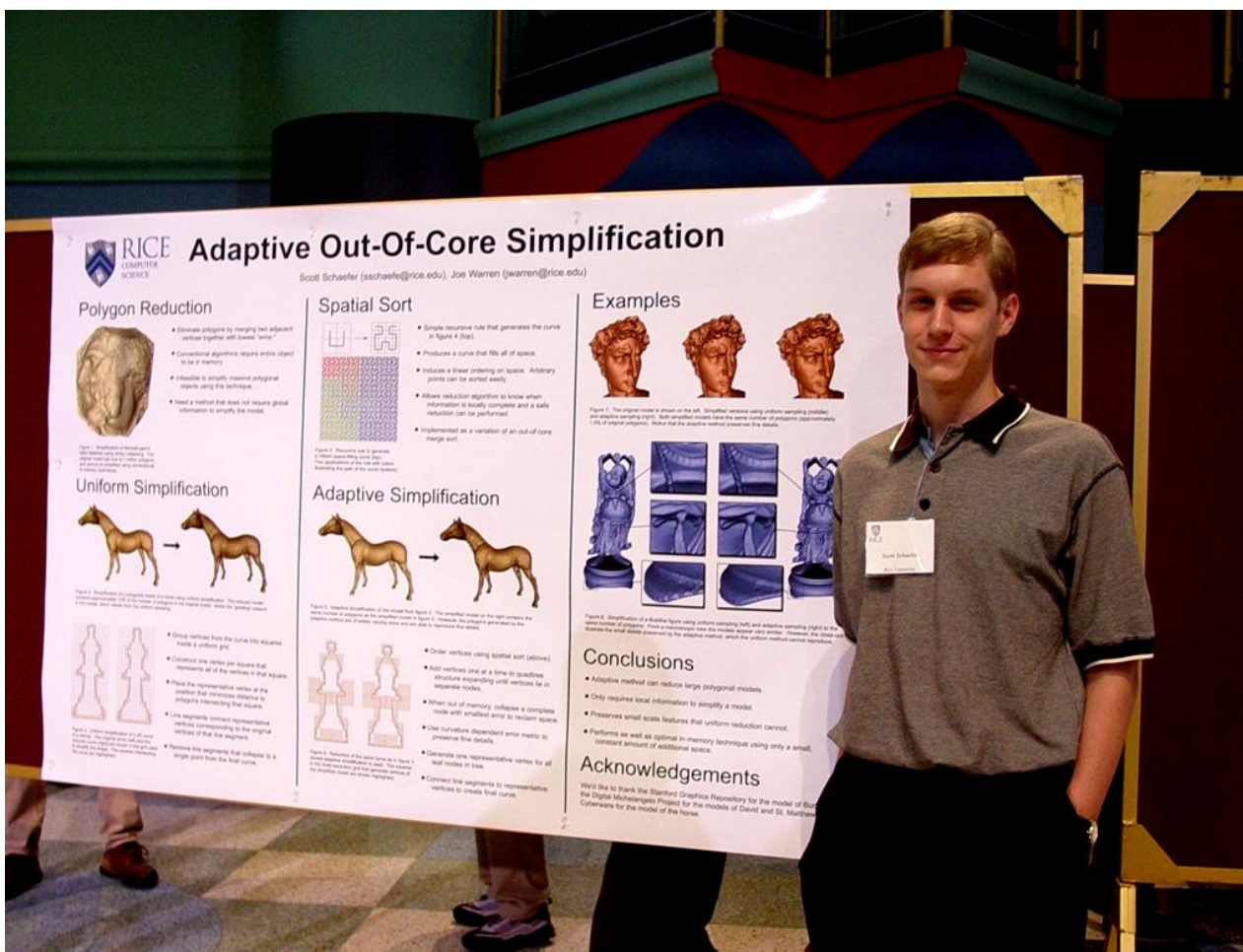




Presenting a Technical Poster

John Greiner



Adaptive Out-Of-Core Simplification

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Polygon Reduction



- Removes polygons by merging two adjacent vertices together with "lowest triangle"
- Connection algorithms require entire object to be in memory
- Infeasible to simplify massive polygonal objects using this technique
- Need a method that does not require global information to simplify the model

Uniform Simplification



Figure 1. Simplification of a polygon mesh (1.5 million vertices) using uniform reduction. The resulting mesh is shown on the right. The original mesh is shown on the left. The simplified mesh is shown on the right.



- Strip vertices from the curve into squares needs a uniform grid
- Construct one vertex per square that represents all of the vertices in that square
- Place the representative vertex at the position that minimizes distance to polygons intersecting that square
- Use quadrants to cull representative vertices corresponding to the original vertices of that the segment
- Remove the segments that collapse to a single point from the final curve

Spatial Sort



- Simple recursive rule that generates the curve in Figure 4 (left)
- Produce a curve that fills all of space
- Reduce a linear ordering on space. Arbitrary points can be sorted easily
- Advise reduction algorithms to know when information is locally complete and a safe reduction can be performed
- Implemented as a variation of an out-of-core merge sort

Figure 2. Recursive rule to generate the space-filling curve.

Adaptive Simplification



Figure 3. Adaptive simplification of the model from Figure 1. The simplified model on the right contains the same number of polygons as the original model (1.5 million). The simplified model is shown on the right. The original model is shown on the left. The simplified model is shown on the right.



- Order vertices using spatial sort (above)
- Add vertices one at a time to quadtree structure expanding until vertices fit in separate nodes
- When out of memory, collapse a complete node with smallest error to retain space
- Use curvature-dependent error metric to preserve the details
- Generate one representative vertex for all "leaf" nodes in tree
- Connect leaf segments to representative vertices to create final curve

Figure 4. Recursive rule to generate the space-filling curve.

Examples



Figure 5. The original model is shown on the left. Simplified versions using uniform sampling (middle) and adaptive sampling (right). The adaptive method reduces the number of polygons (approximately 1/3 of original polygons). Notice that the adaptive method preserves the detail.



Figure 6. Simplification of a classical bust using uniform sampling (left) and adaptive sampling (right) for the head, torso, and base. From a representative view the visible error is smaller. However, the adaptive method preserves the detail. The adaptive method preserves the detail.

Conclusions

- Adaptive method can reduce large polygonal models
- Only requires local information to simplify a model
- Preserves small scale features that uniform reduction cannot
- Performs as well as optimal in-memory technique using only a small, constant amount of additional space

Acknowledgements

We'd like to thank the Stanford Graphics Repository for the model of the Digital Michelangelo Project for the models of David and St. Matthew. Cylinders for one model of the horse.

Connect with the Audience



Greet audience.

Why are they interested?

What are their backgrounds?

How will they benefit?

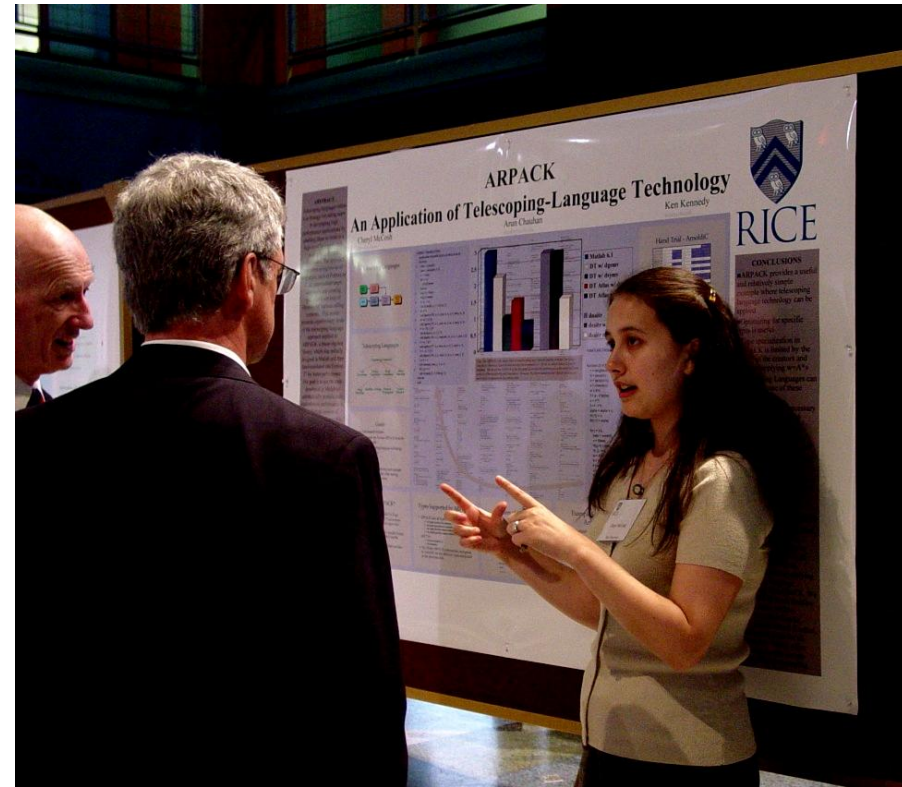
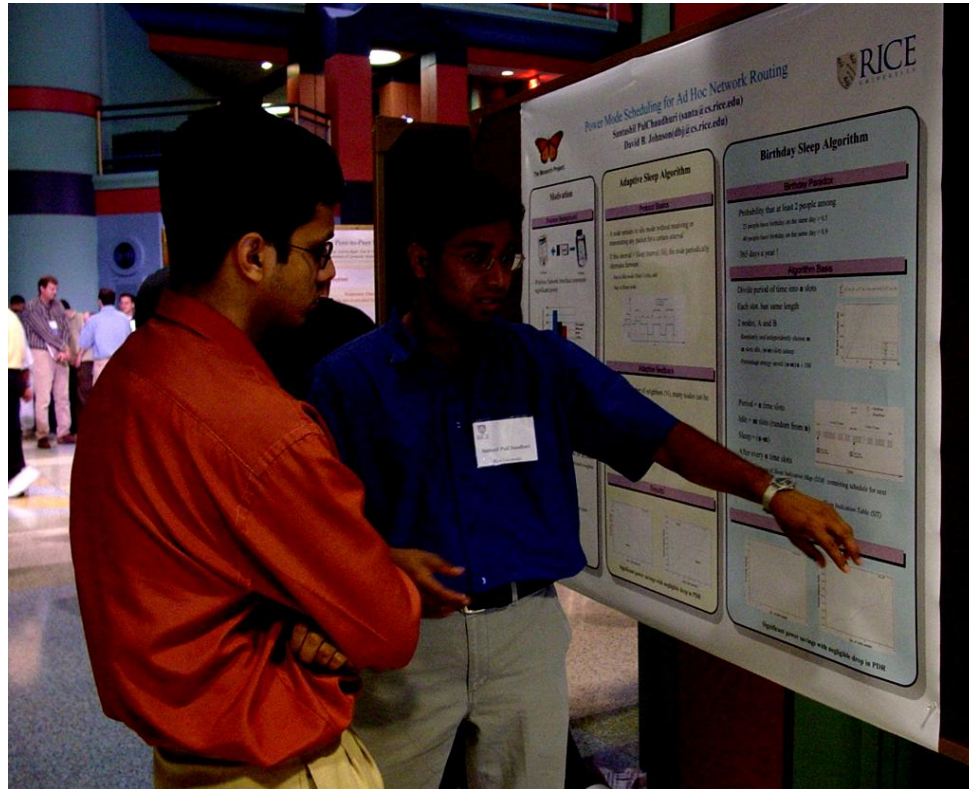
What are their questions?

Prepare 30 second, 2 minute, and 5 minute talks.

- Different levels of interest
- Different backgrounds
- Be able to summarize key points in 2-3 sentences.
- Be able to start from any section.

Reinforce key points.

Communicate with Confidence



- Stand up straight
- Don't block view of poster
- Speak up

- Be enthusiastic
- Maintain eye contact
- Adjust pacing
- Integrate gestures