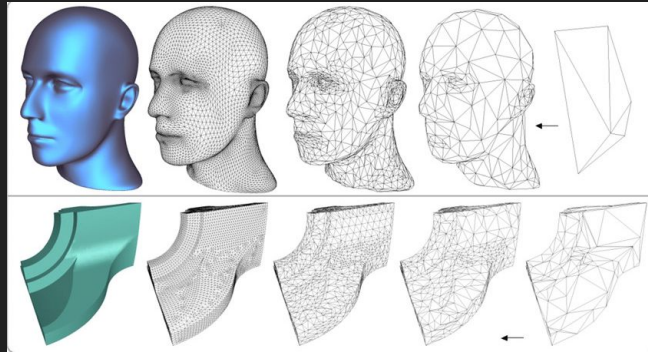


Valence-driven decimation for lossless transmission



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ENSEEIH

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Outline

- Paper Overview
- Key concepts
- Algorithm
- Challenges
- Results
- Conclusion
- References

Paper Overview

Informations:

- Title: Progressive Compression for Lossless Transmission of Triangle Meshes
- In: SIGGRAPH 2001
- Authors: Pierre Alliez and Mathieu Desbrun

Key contributions:

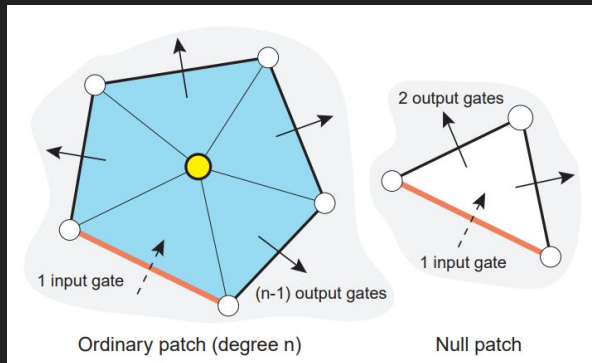
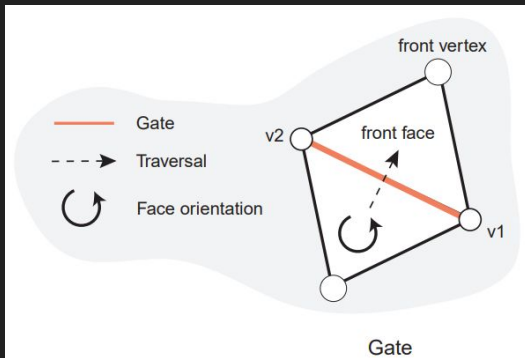
- 3-step iterative encoding (Non-deterministic decimating conquest, retriangulation, cleaning conquest)
- **Geometry encoding**

Results:

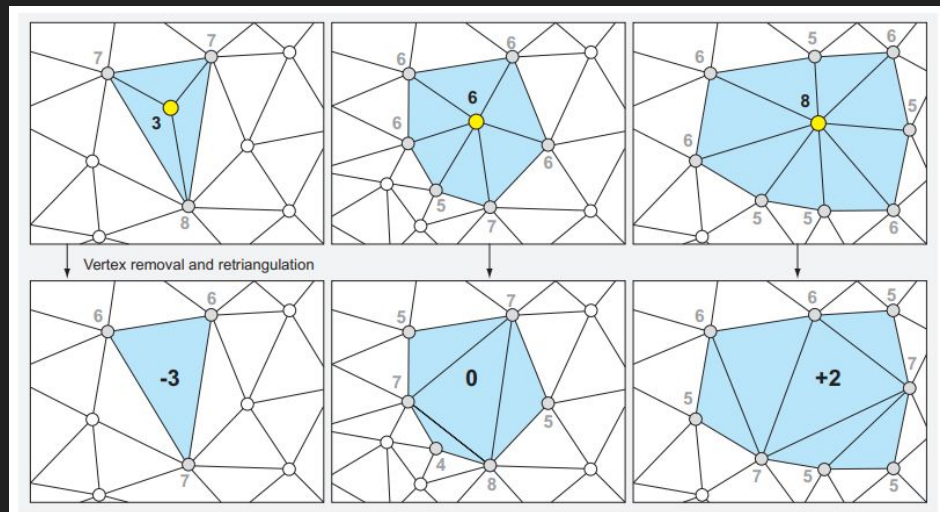
- VRML 3D model down to 1.7% of its size for a 10-bit quantization (2.3% for a 12-bit quantization)
- Very progressive reconstruction

Key concepts

Triangles Meshes

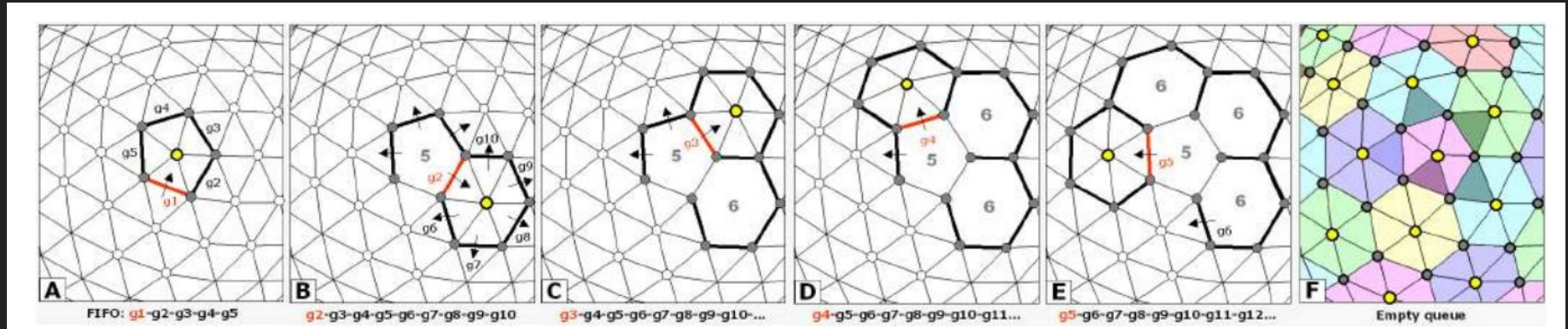


Importance of Low Valence Vertices



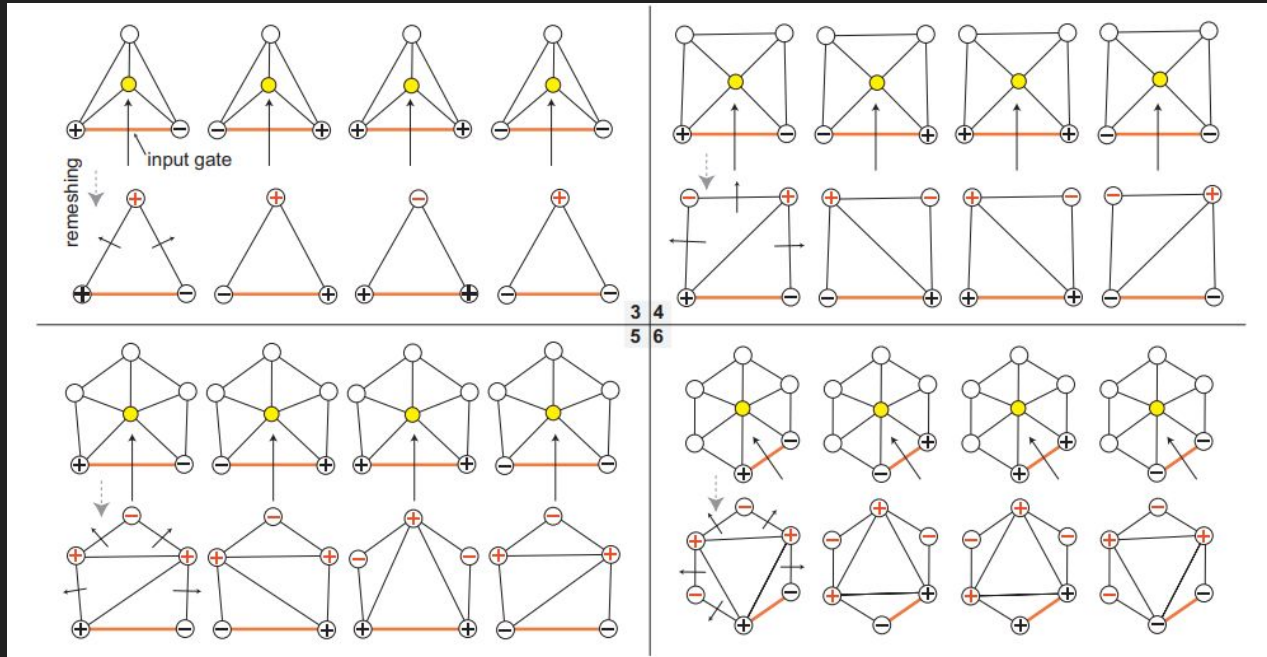
Algorithm

Step 1: Decimating Conquest (valence ≤ 6)



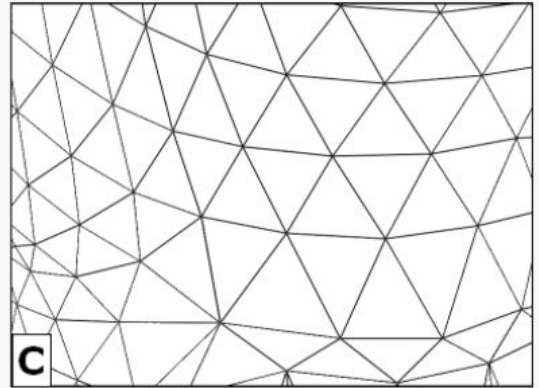
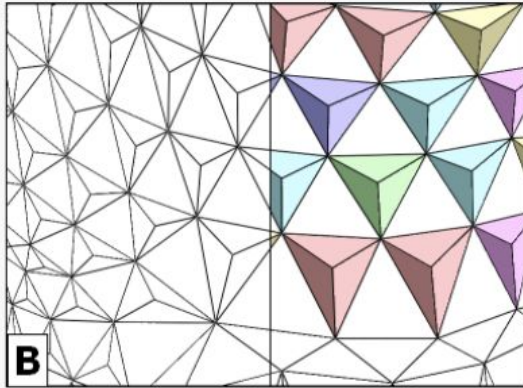
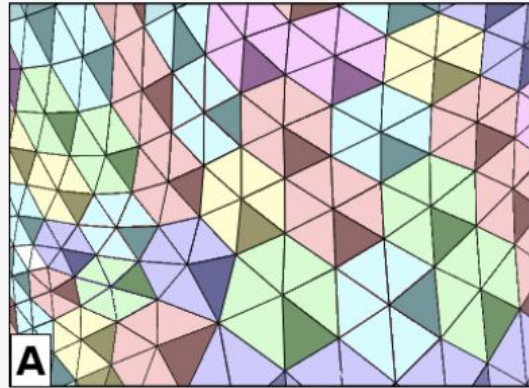
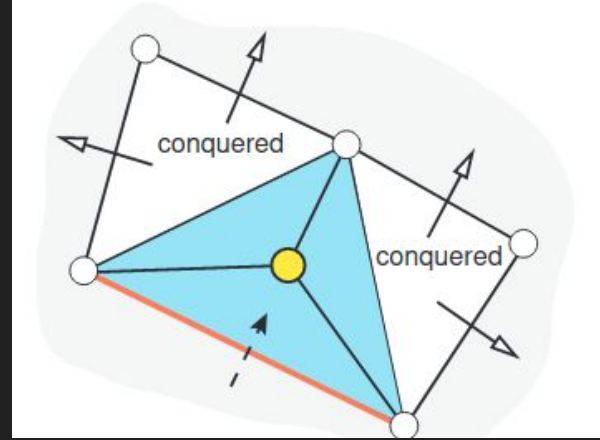
Algorithm

Step 2: Adaptive Retriangulation



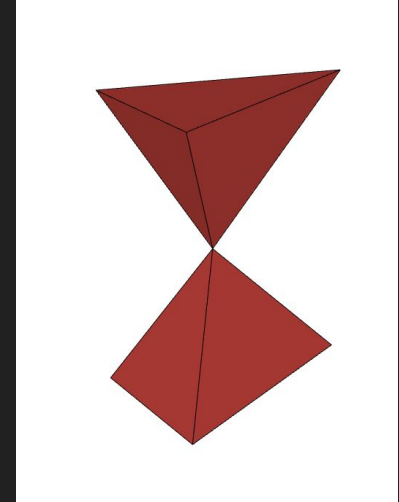
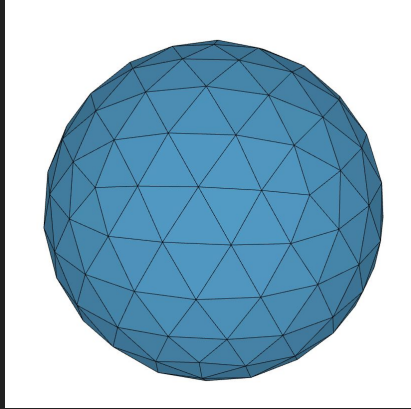
Algorithm

Step 3: Cleaning Conquest (valence = 3)



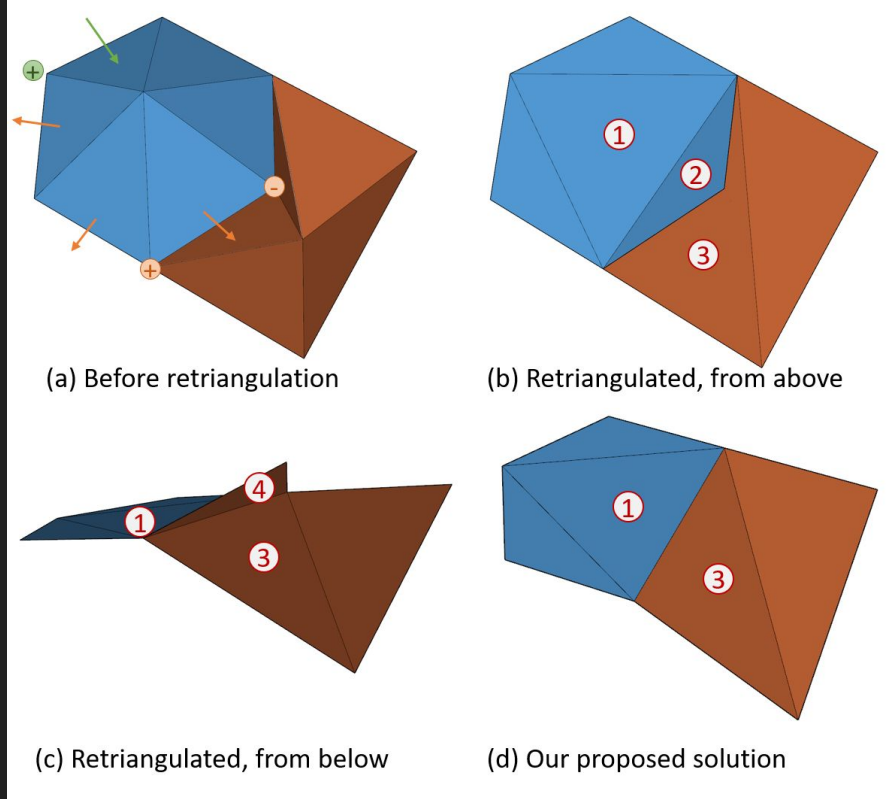
Issues / Robustness : topology

- Good topology required
- No “hourglasses”
- Only one object (eg., suzanne)
- Closed models (stanford bunny)



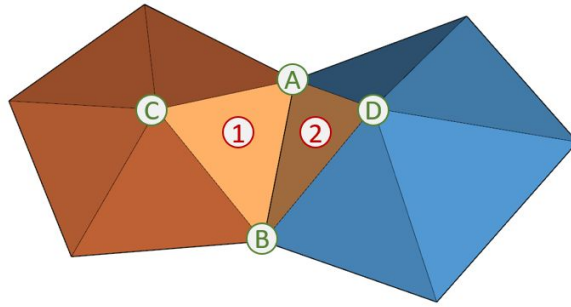
Issues : during implementation

- Double-sided faces

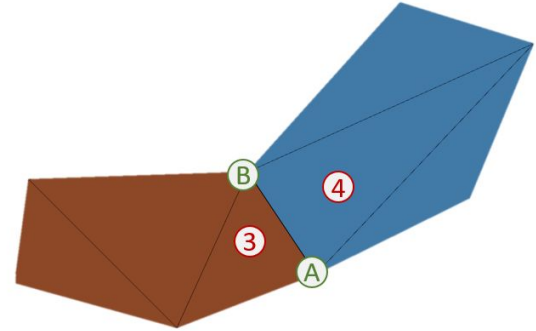


Issues : during implementation

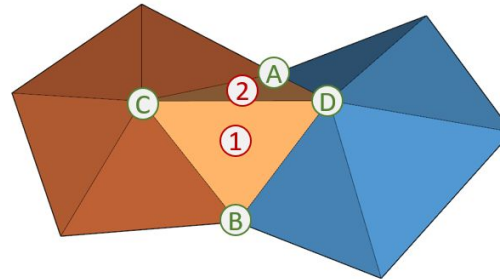
- Double-sided edges



(a) The double-sided edge, from above

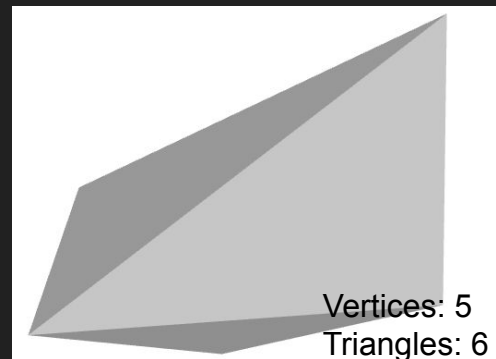
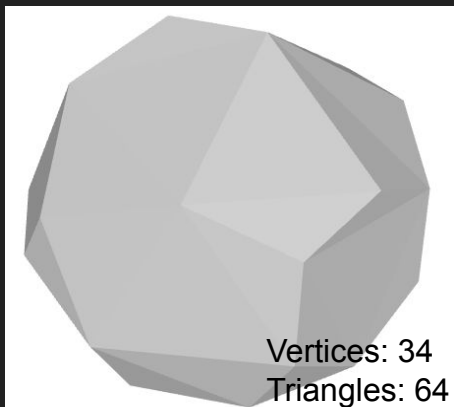
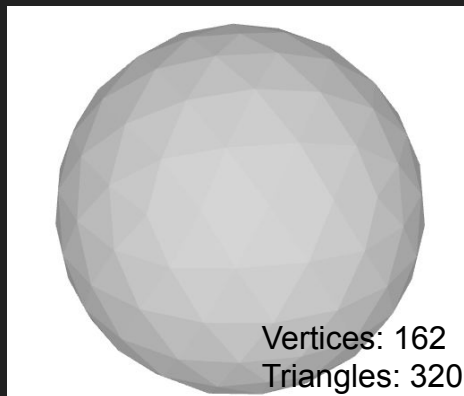
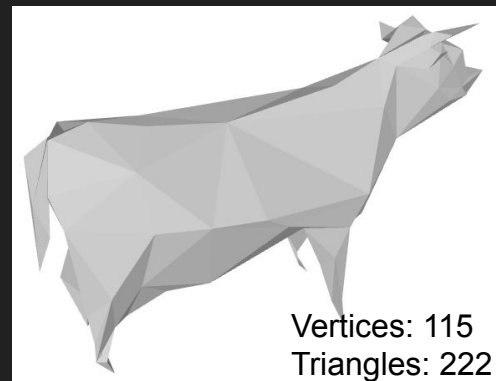
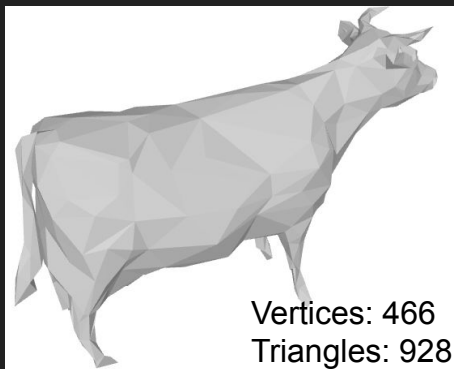
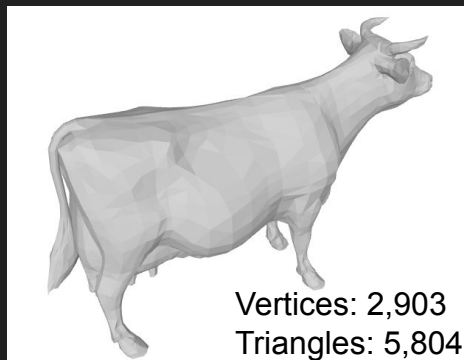


(b) The double-sided edge, from below



(c) Our proposed solution

Results: Algorithm

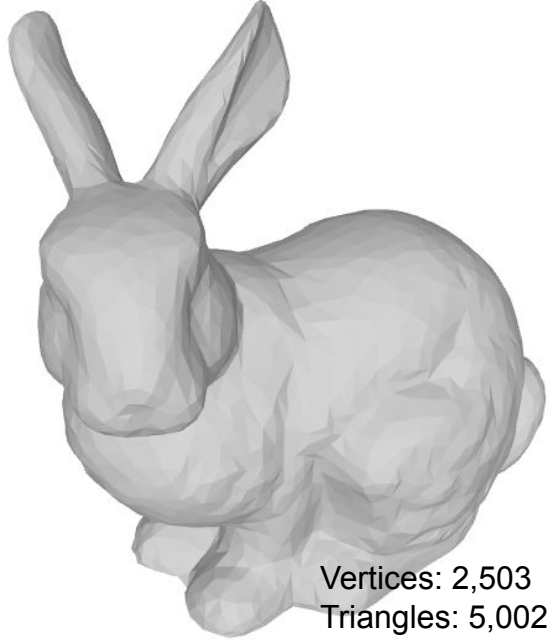


Initial

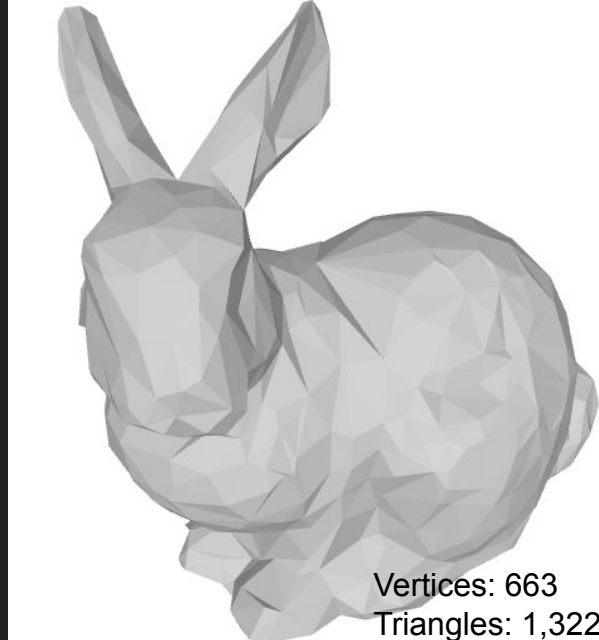
Intermediate

Final

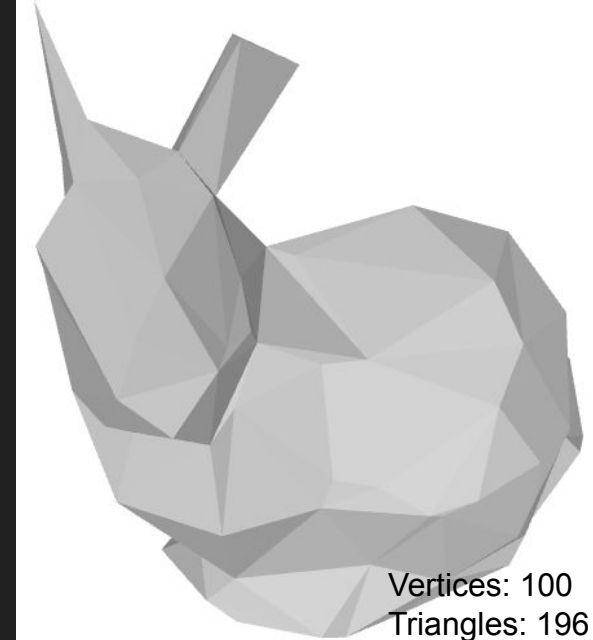
Results: Algorithm



Initial



Intermediate



Final

Results: Progressive Transmission

Conclusion

Pros

- Very Progressive
- Efficient

Cons

- Complex implementation
- Robustness

References

- Alliez et al., Progressive Compression for Lossless Transmission of Triangle Meshes, SIGGRAPH 2001