Wavelet-Based Multiresolution for Mobile Graphics

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Objective
How to render meshes or images on mobile device with best quality.

Motivations
- Storage (Memory, Disk...)
- Transmission (Bandwidth...)
- Power
- Encoding/Decoding
- Rendering

Wavelet-based Multiresolution

Def.: Encoding that permits transmission and rendering pieces by pieces

Wavelet-Based Multiresolution Analysis

Wavelets Transformation

\[ P^{(j)} = [P \quad Q] \frac{P^j}{d} \]

Where \( P \) are low pass filter, \( Q \) are high pass filter, \( d \) are the wavelet coefficients at level \( j \)

Multiresolution Representation \( M \)

= Base \( M_0 \)
+ Sum of correction terms (wavelet coefficients)

- 20 coefficients
- 200 coefficients
- 16,000 coefficients

Implementation

Which level or how much wavelet coefficients will be sent to the mobile device and reconstructed

Experimental Results on 2D Image and 3D Mesh

- 0.2 ms
- 1.5 ms
- 0.4 ms
- 6.0 ms

Future Work

- Error Calculating and Comparing
- L1 Object Space Error
- Image Space Error
- Establish a framework which can deal with the wavelet transform for 2D image or 3D mesh

Conclusion

Wavelet-based multiresolution is a good solution that permits piece-wise transmission and rendering of graphics models. To transfer wavelet coefficient files is easier to transfer original file and the decoding time is also acceptable.

Which level or how much wavelet coefficients will be sent to the mobile device and reconstructed

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Wavelet coefficients (detail)