3-D Time Varying Meshes Compression Via Key Frame Representation Based Geometry Video (KFRGVV)

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Background and Motivation

• Extensive application of 3-D dynamic meshes
  -- video games, movie production
  -- social media, virtual reality, etc.
Background and Motivation

- 3-D scanning technology

(a) Structured light system
(b) Multi-view system
Background and Motivation

• Problem:

--Huge_datasize: 150MB raw data per second (30 fps and 250K).

--Time-varying meshes: number of vertices and connectivity change from frame by frame.
Outline

1. Related work
2. Proposed compression framework
3. Experimental results
4. Conclusion
1. Related work

-- Competition of dynamic mesh compression by IEEE SPS.
-- Huawei/3DLife fast and efficient compression for TVM.
-- Extended block matching from 2D video to 3D TVM [1] [2]
-- Remesh and spatiotemporal wavelet transform [3].

1. Related work

--- geometry video (GV) based
- Using 3-D shape and texture information [4].
- Expression-invariant parameterization [5] [6].
- Conformal geometry video [7].
- Holovideo [9].

2. Proposed compression framework
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- TVMs
- GVR
- GV
- KFR
- OPS
- R, D
- Q
- Recon. matrix
- KFRGV
- Reorder
- Video encoder
- Lossless Coding
- Bitstream
- (a) Encoder
- KFRGV
- Intra/Inter prediction
- DCT
- Quant.
- Entropy coding
- bitstream

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2. Proposed compression framework

- Diagram showing the compression framework with stages such as GVR, KFR, Reorder, Video encoder, Reconstructor, Decoding, etc.
2. Proposed compression framework
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\[(n^*, Q^*) = \arg \min_{n \in \mathbb{N}, Q \in \mathbb{Q}} D(n, Q) \quad \text{s.t.} \quad R(n, Q) \leq R_t,\]
Experimental results

-- R-D performance
- bpf: bit per frame.
- RMS error: root mean square error.

-- Visual results:
Experimental results
Conclusion

A novel framework for compressing 3-D TVMs has been presented. We experimentally demonstrate that the proposed scheme outperforms existing algorithms to a large extent.
Thanks

Q&A