Scene Appearance Change As Framerate Approaches Infinity

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The Question

• Cameras use light to construct a model of scene appearance, **not record light properties**
• Model should change as the scene changes
  – How fast does the scene change?
  – Can we know (e.g., photon shot noise)?
• Increasing temporal resolution (framerate) should produce a sharply decreasing amount of additional data. **Does it?**
Why We Care

- If so, can use high framerate capture and
  - Pick still exposure interval after capture
  - HDR (High Dynamic Range)
  - Framerate-independent video
  - Negligible temporal gaps between frames
- In other words, can implement TDCI
  (Time Domain Continuous Imaging)
High-Framerate Cameras

- Consumer cameras with 240 to 1000 FPS
- Temporally-skewed multi-cameras... like *FourSee*:
Experiments

- Consumer cameras @ 240-1000 FPS record a normal scene in *ordinary* lighting
- Synthesize lower FPS by *stacking*
- Measure information content by TDCI coding
  - Waveform per pixel
  - Noise model
  - Record each time a pixel value changes from expected by more than noise
Canon PowerShot N @ 240 FPS
(original .mov was 66,252,172 Bytes)
Canon PowerShot N @ 240 FPS
(original .mov was 71,434,052 Bytes)
Conclusions

- Information content quickly approaches a **constant** as FPS is increased
- Noise model has a huge impact on compression obtained

Want details? See our paper & poster!

[Aggregate.Org](http://Aggregate.Org)

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