TrueImage

Image Enhancement for HFR Cinema

REAL D

HPA UK Tech Retreat 2016

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HFR: a more immersive future for cinema

High Frame Rate Cinema

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  - 1/250th second to notice that an event has occurred
    - Analogous to frame → frame detection
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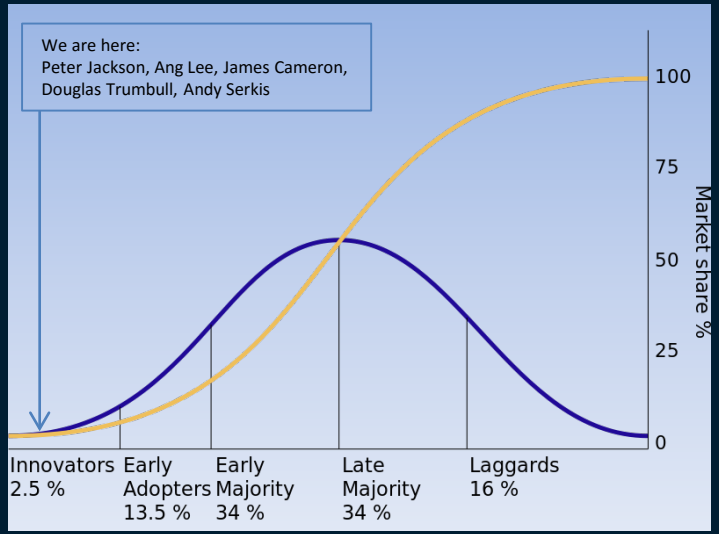
- HFR cinema allows film makers to more naturally replicate the motion perception of the human visual system
  - Faster exposure times also improve spatial resolution by reducing motion present during exposure
    - Less motion blur → sharper images
  - Deeper psychological immersion into film content?
    - Maybe…

HFR: a more immersive future for cinema



Rogers Everett - Based on Rogers, E. (1962) Diffusion of innovations. Free Press, London, NY, USA.

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At what cost?

HFR capture comes at the cost of reduced exposure time

- Elementary my dear…
    - More photons hitting camera sensor == better image data
    - HFR capture reduces the camera’s ability to accurately record images
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        - Half the exposure time == half the photons gathered
            - Physical limitation
    - Result → Noisier images

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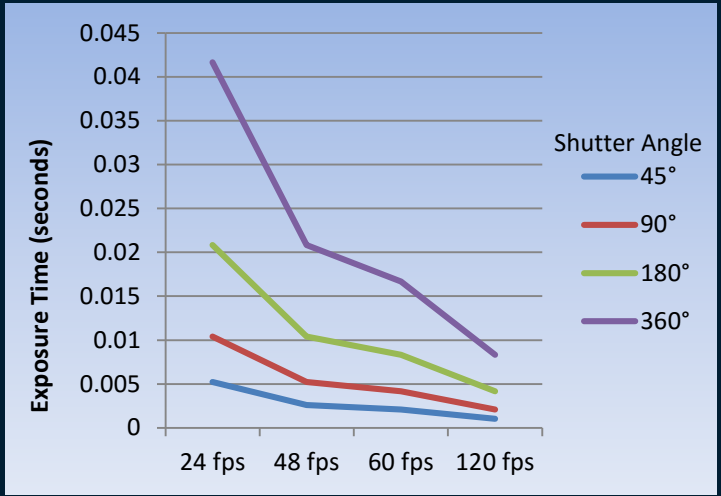

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ARRI Alexa 24 fps ISO 800

ARRI Alexa 120 fps ISO 2560

Image credit Bill Bennett ASC

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- Our solution
  - Image enhancement through temporal-spatial analysis and correction using our TrueImage software

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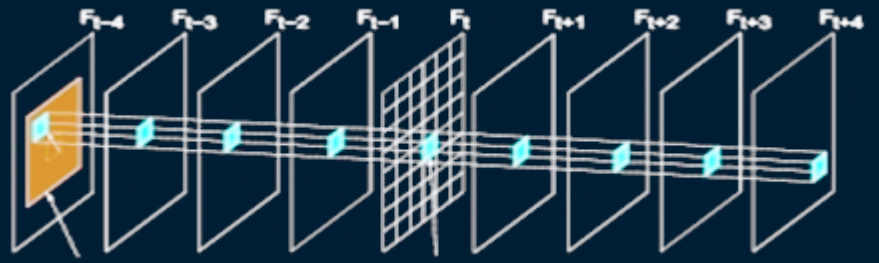
Original Source

TrueImage Result

How it works…

Data Collection

- The perception of motion in video sequences requires recurrent data in successive frames
  - This data recurrence can be exploited as additional photonic samples and used to boost an image's signal
  - Motion track each pixel forward and backward in time
    - Facilitates virtual acquisition of additional samples of real world data
      - Works exceptionally well in regions of detail
      - Can fail in regions of low texture, extreme noise, or occlusion



How it works…

Data Collection

- When motion tracking fails?
  - Data similarity exists within single images as well
    - Compare pixel to neighbors
    - Analyze statistical data other than simple RGB sampling
    - Adds more sources of pixel data for statistical modeling
      - Camera gives 3 points of data per pixel (RGB)
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That’s a lot of data!

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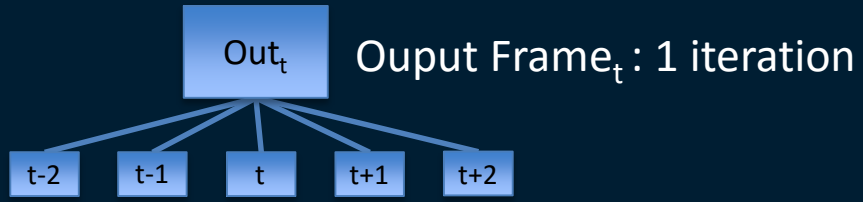

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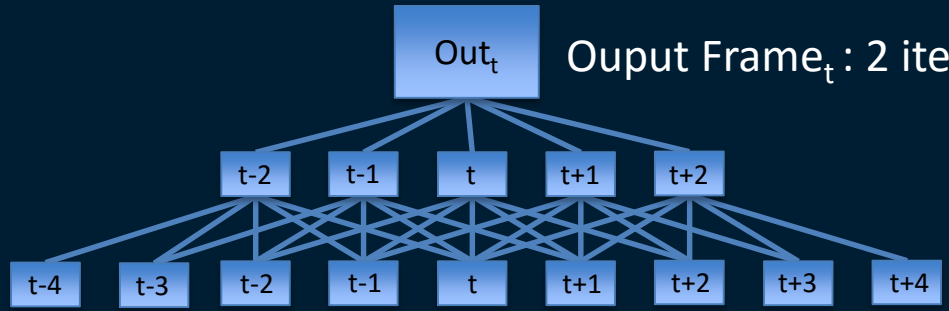

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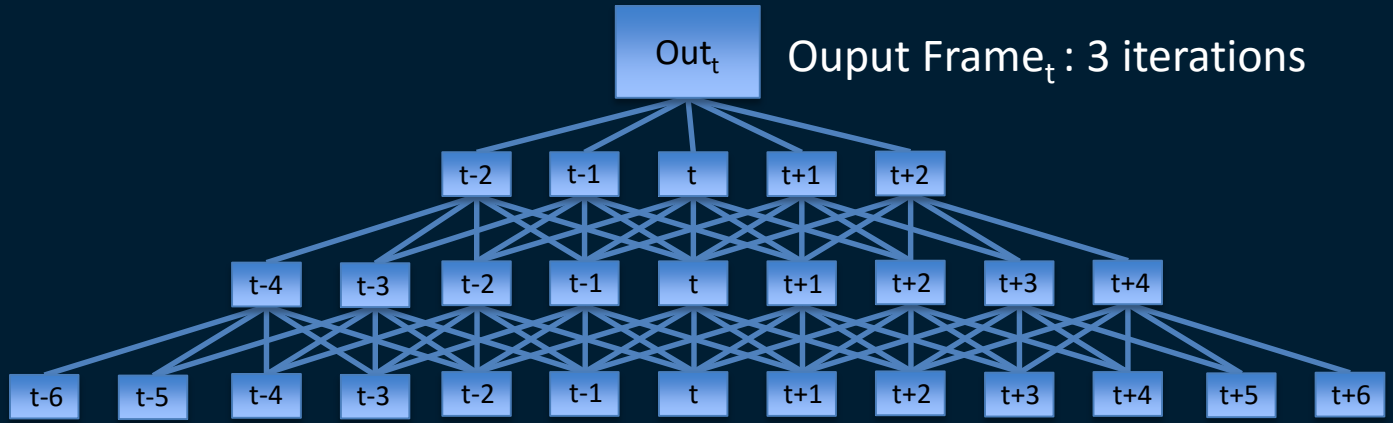

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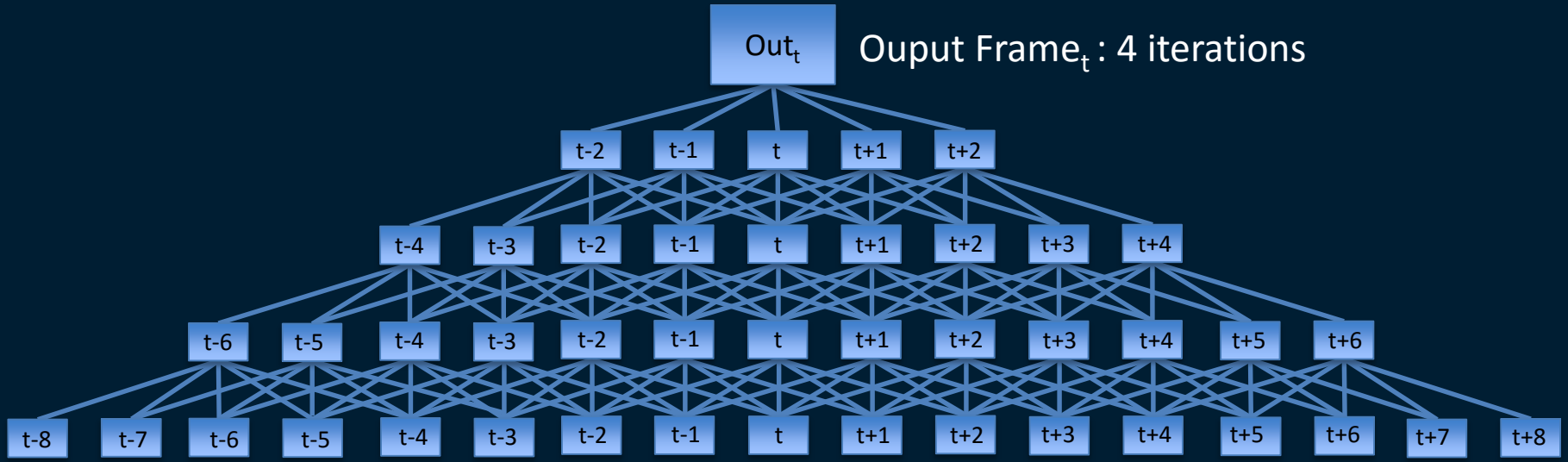

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Original | 1st Pass | 2nd Pass | 3rd Pass | 4th Pass

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Computationally Expensive

- All of this data is difficult to handle
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Results?