EG2013 Tutorial on VIDEO VISUALIZATION

4. Visual Design

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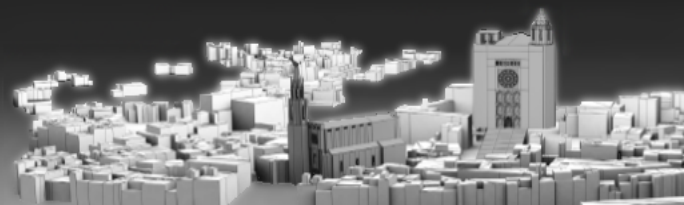
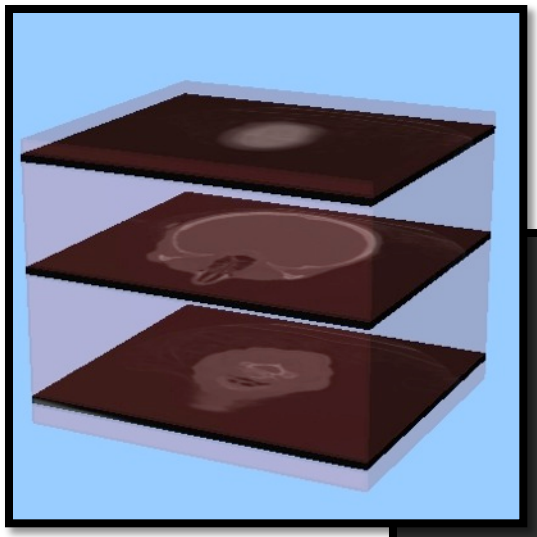
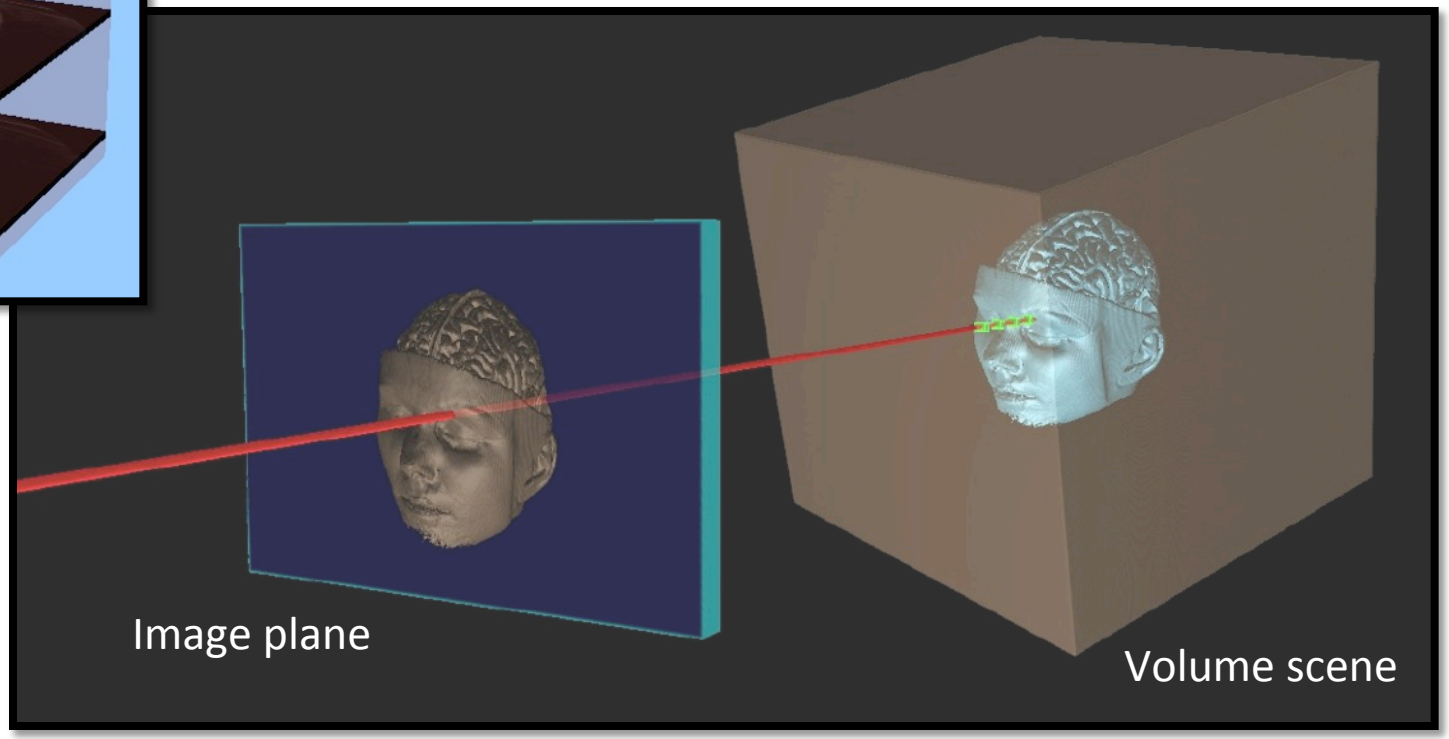


Volume Visualization

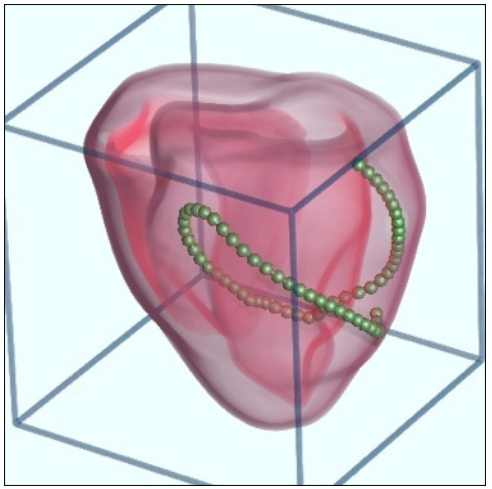
Volume dataset

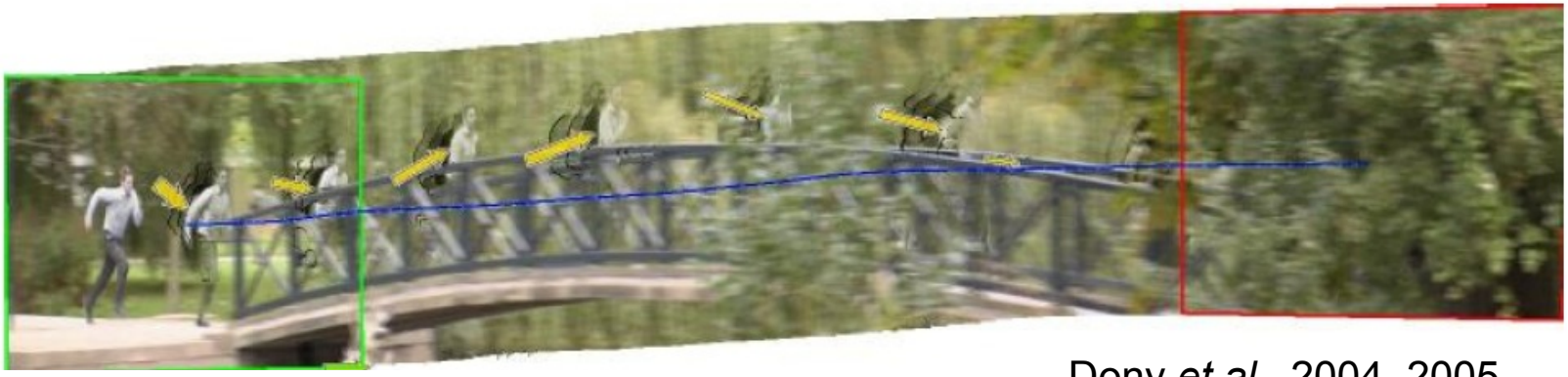




The Curse of Dimensionality

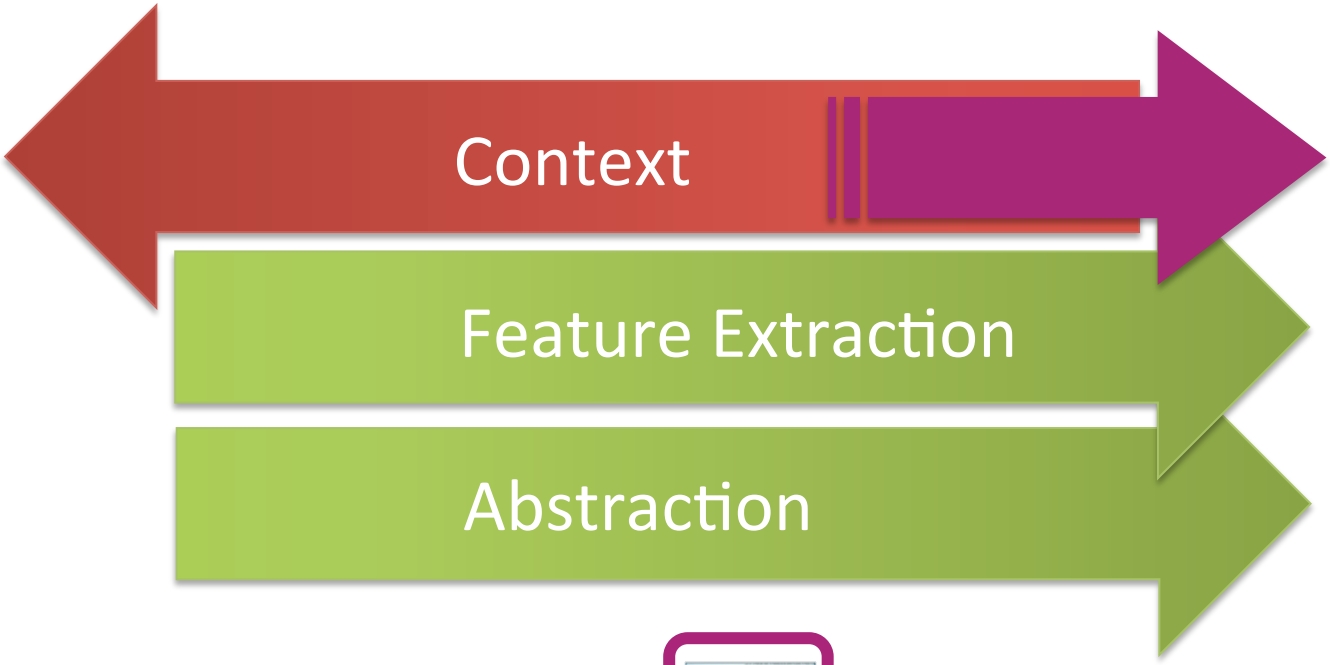
- 3D to 2D difficult enough
  - Semitransparent materials alleviate
- 3D + time (temporal volume)
  - *Animated*: reduces to above case
  - *Static*: Keyframe list, …?
- Abstract representations work well for summaries



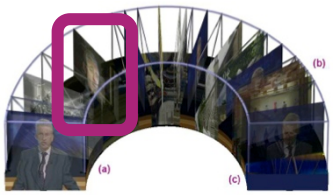


Dony *et al.*, 2004, 2005

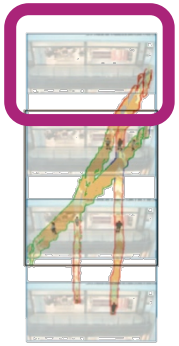
The Trail Ahead

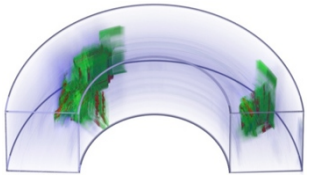


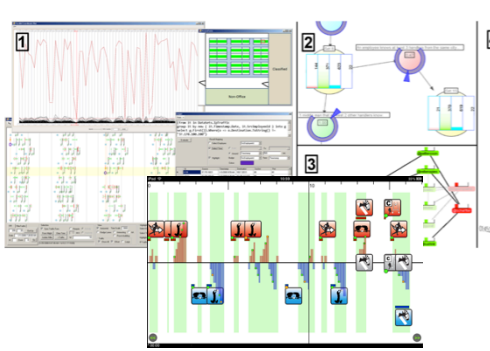
Raw frames

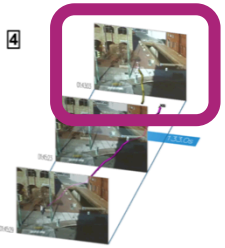


Extrusions









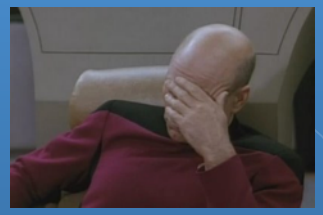
Extraction & Abstraction

If You Don’t Know, Neither Does a Machine

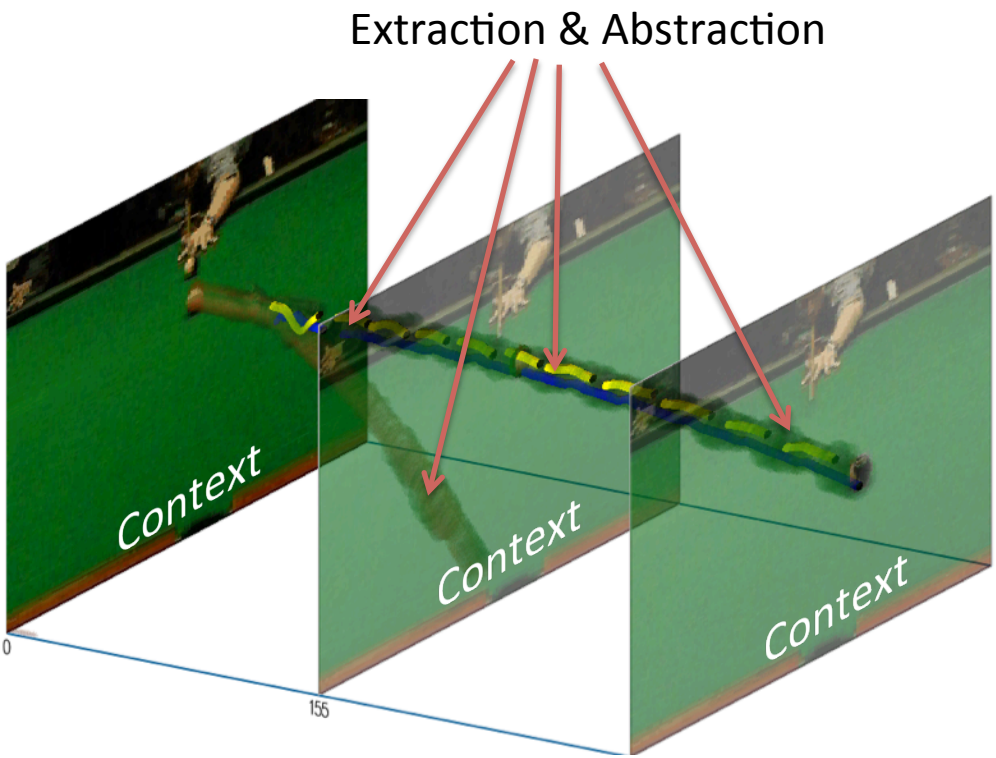
I need an algorithm that detects bad guys in a crowd.

Just use your *intuition*!

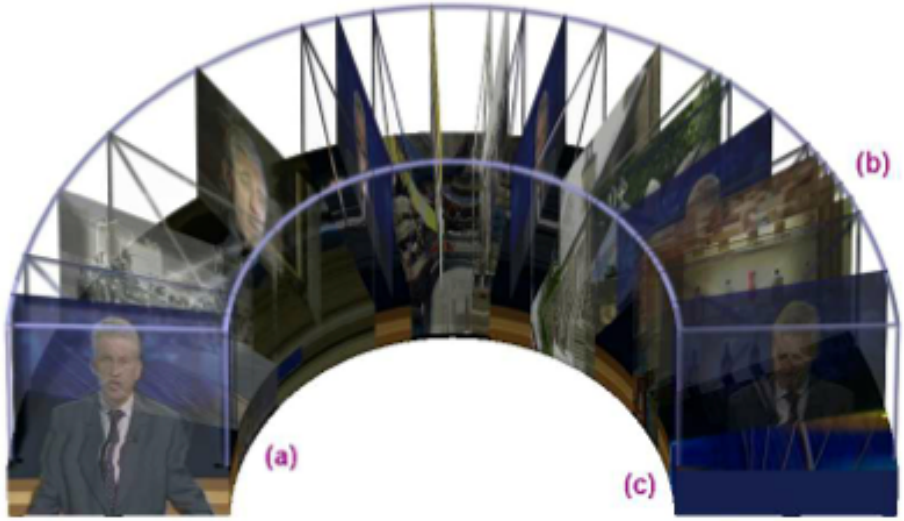
Sure. What does a bad guy look like?



Temporal Visual Signatures …Summarized?



Höferlin *et al.*, 2010

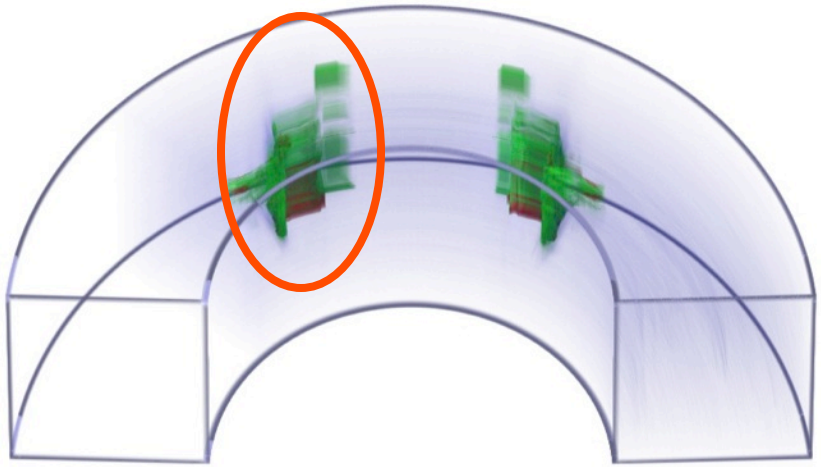


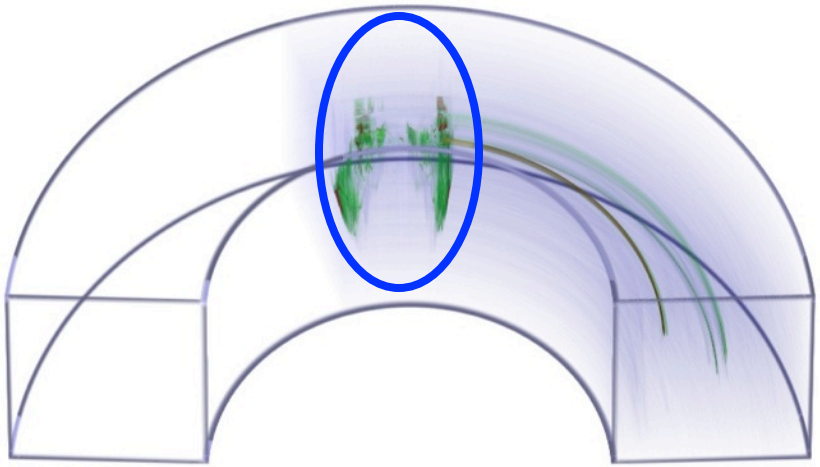
Daniel and Chen, 2003

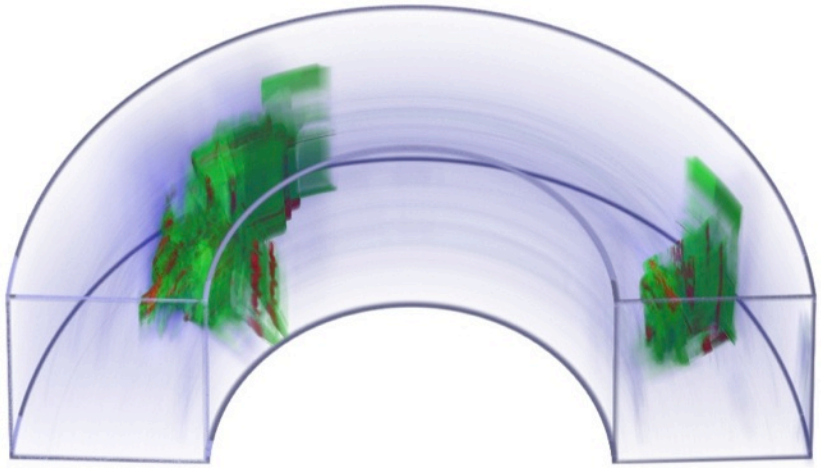
Video: 2D + Temporal Dimension

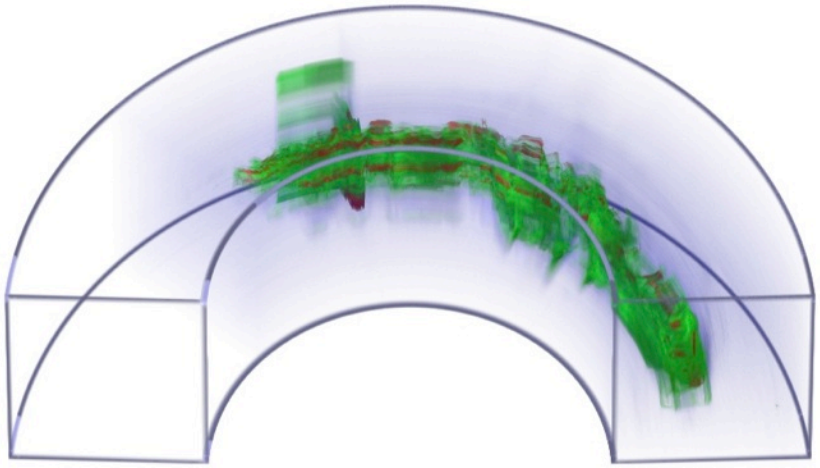
Horseshoe Design

Daniel and Chen, 2003

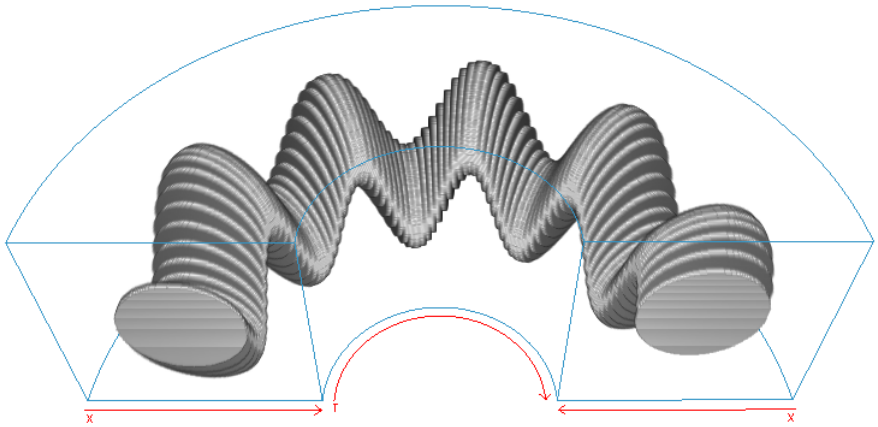




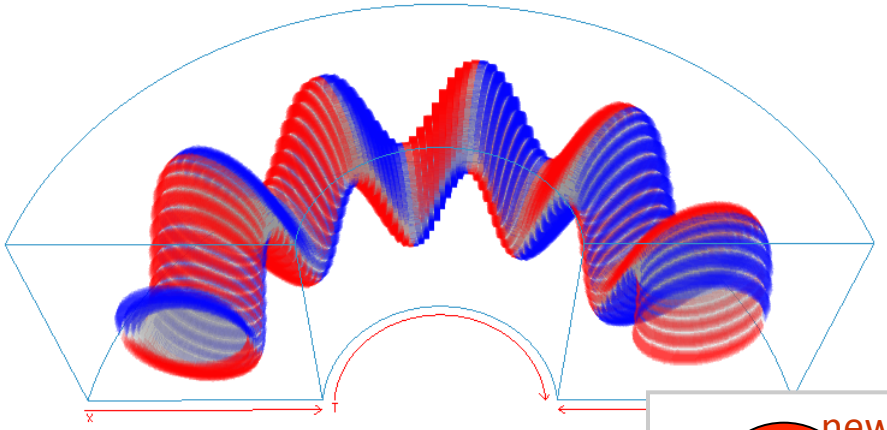




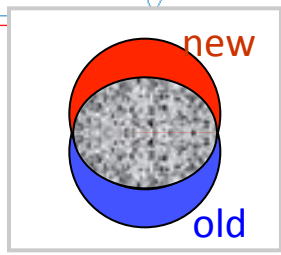
Visual Signatures (Chen *et al.*, 2006)

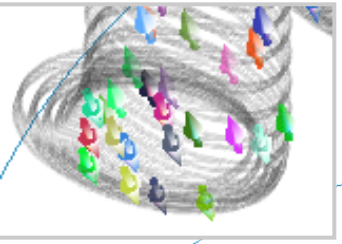


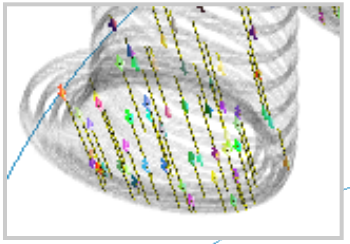
Extracted Objects

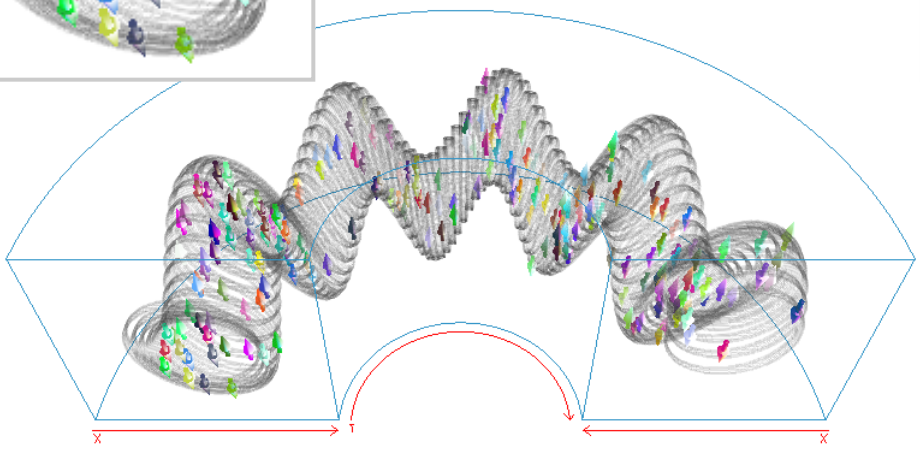


Difference Volume

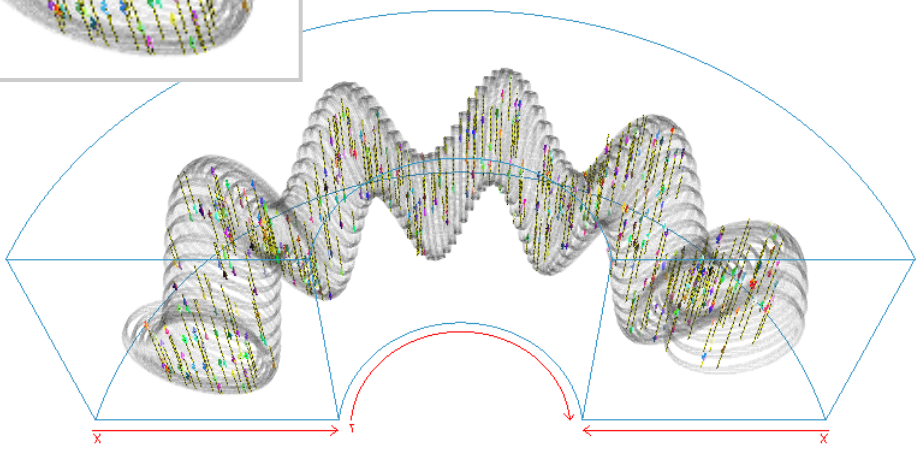








Motion Flow with Arrow Glyphs

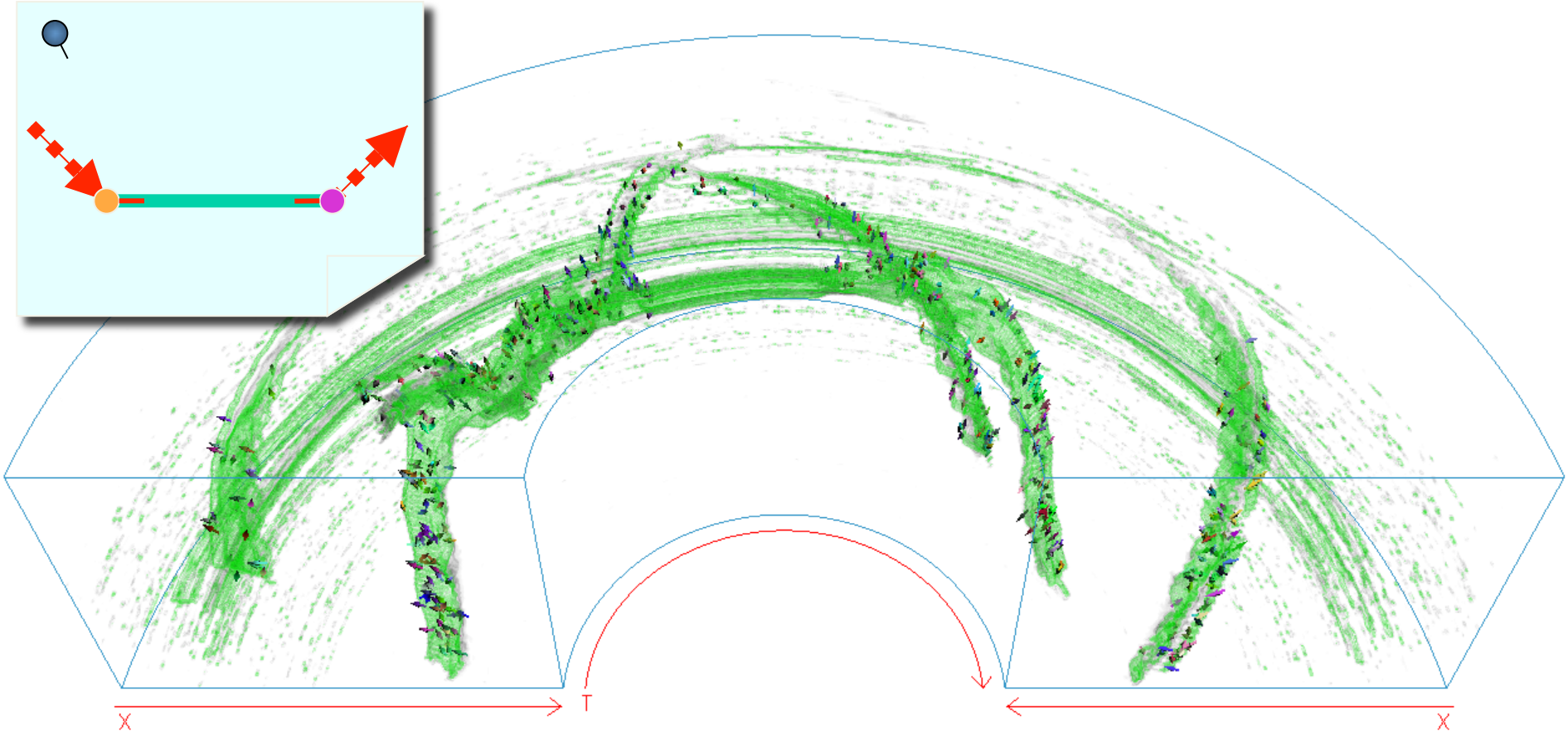


Motion Flow with Streamlines

Example: Fight, with man down



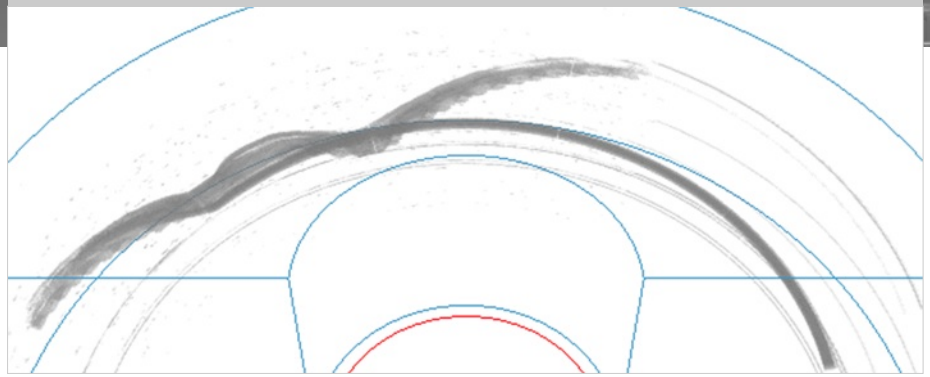




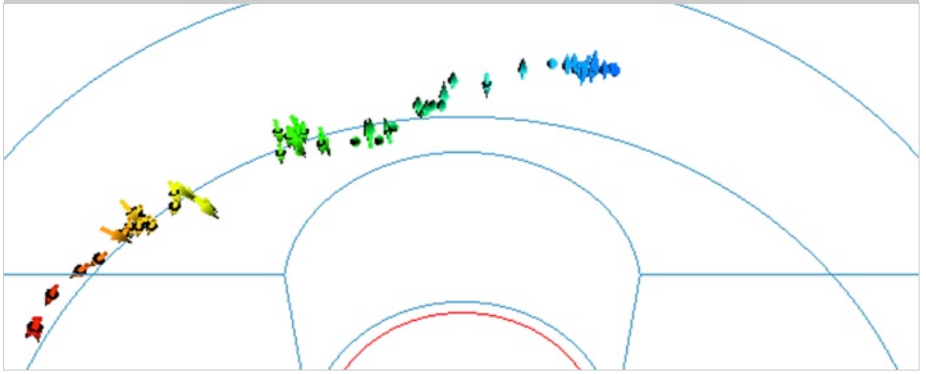
Volume & Flow

- Object volume
  - represents objects in the scene
  - but no motion features
- Optical flow
  - cannot adequately convey the presence of objects
- Combined visualization
  - a person enters the scene
  - stops to deposit a box
  - moves around the box
  - exits the scene

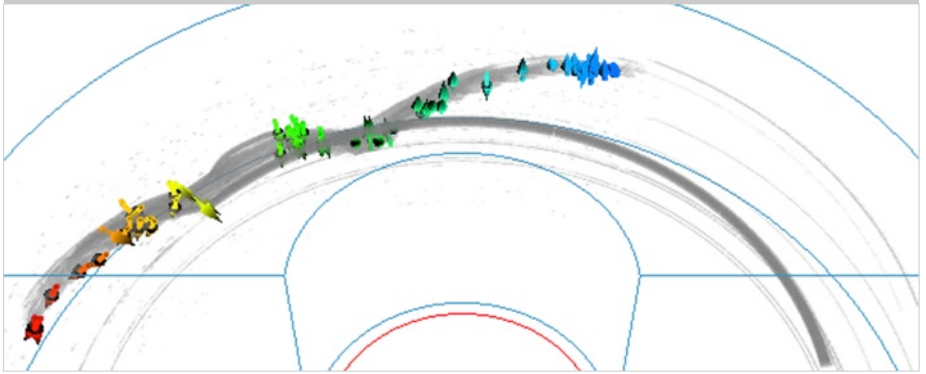
object volume



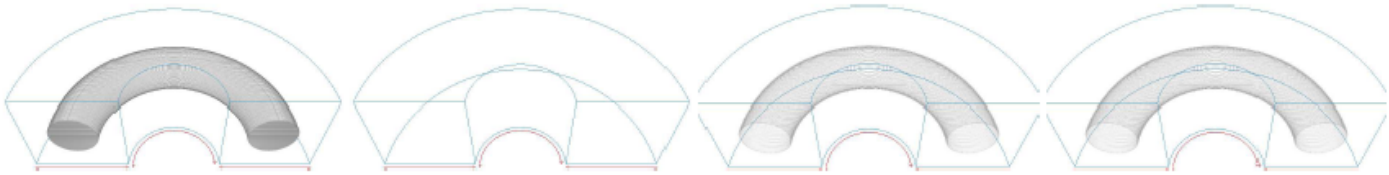
optical flow



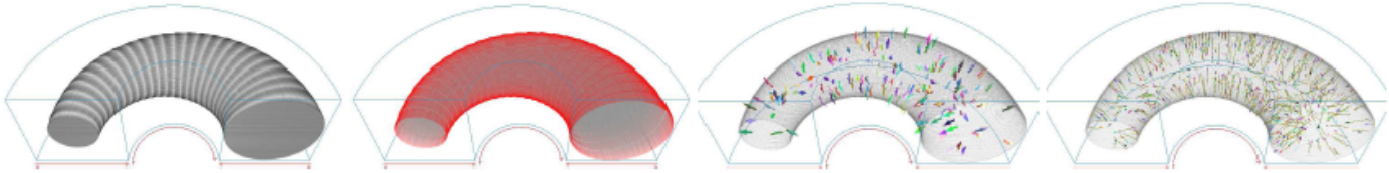
combined visualization



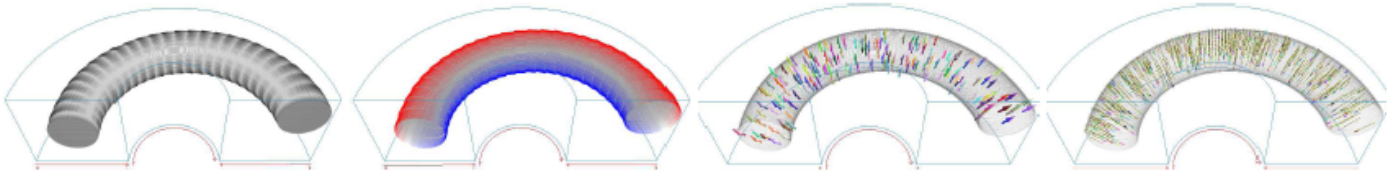
Motion Cases



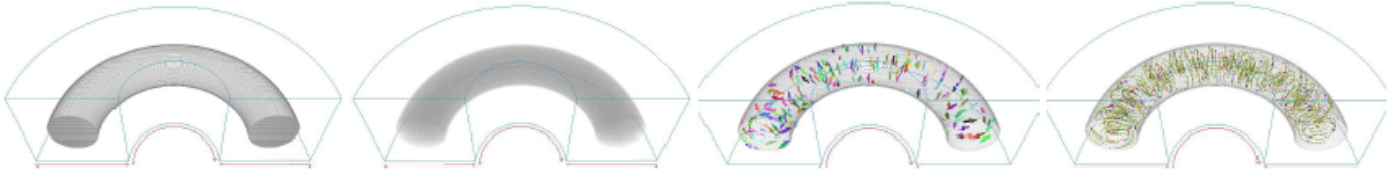
(a) Motion Case 1: the sphere is stationary



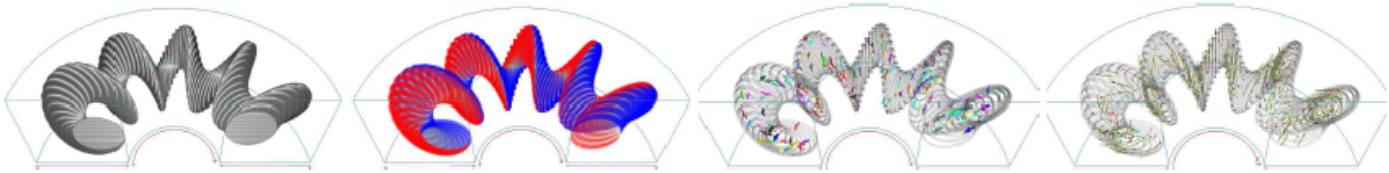
(b) Motion Case 2: the radius of the sphere increases by 100%



(c) Motion Case 25: the sphere moves towards the upright corner of the image frame

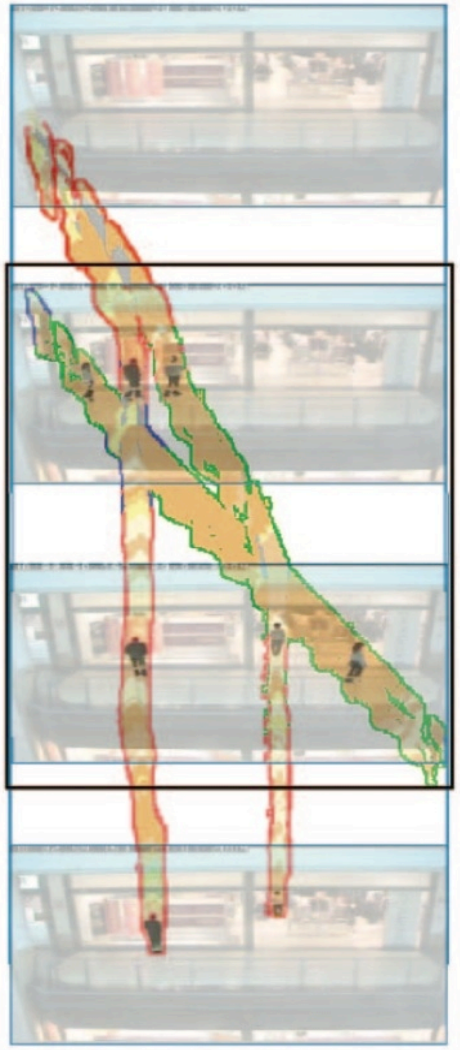


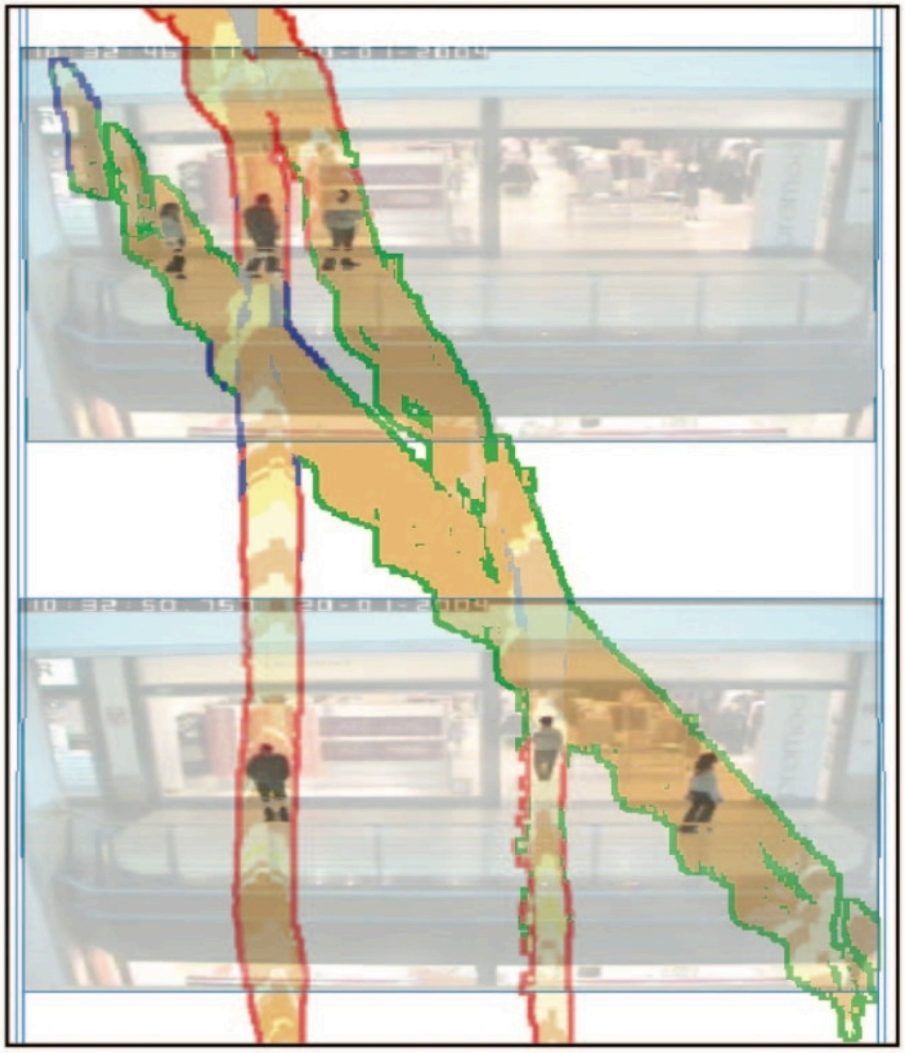
(d) Motion Case 31: the sphere spins about the z-axis without moving its center



(e) Motion Case 40: the sphere makes 5 rotations about the centre of the image frame

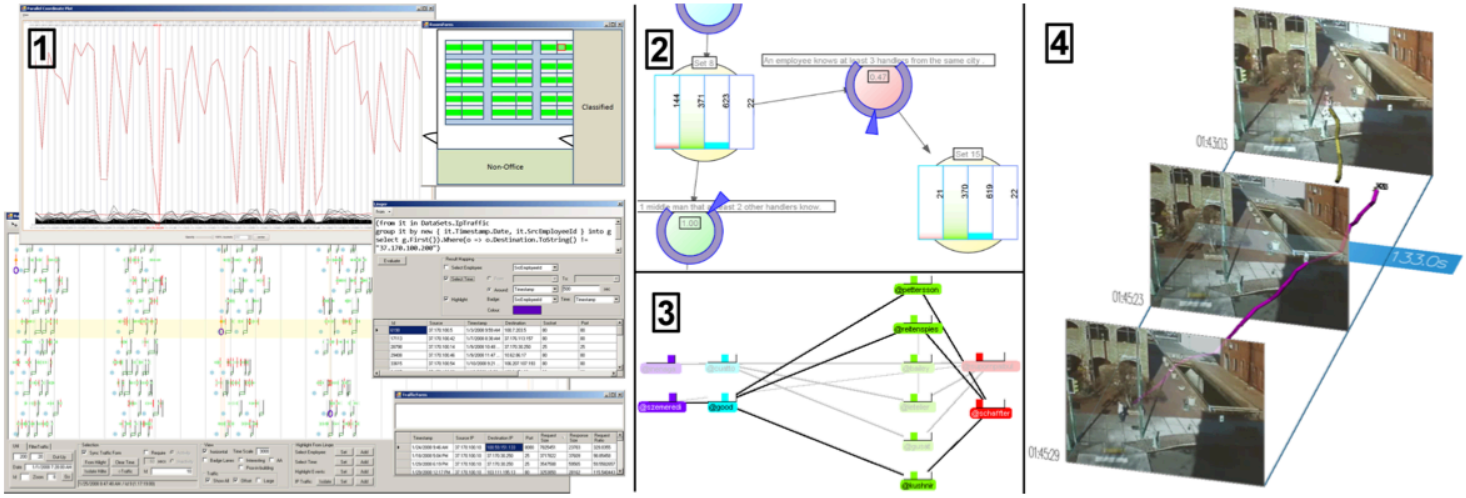
Video Perpetua-Gram (VPG)

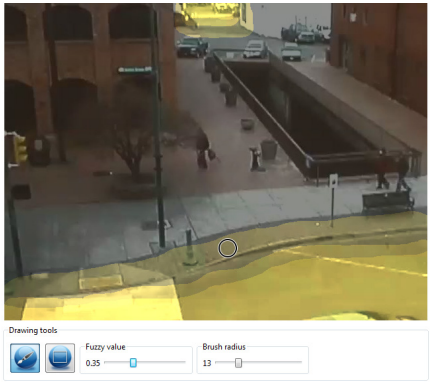


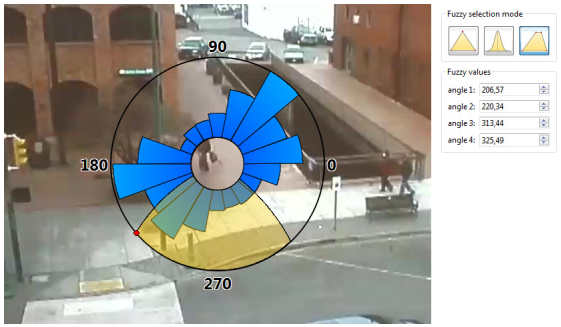


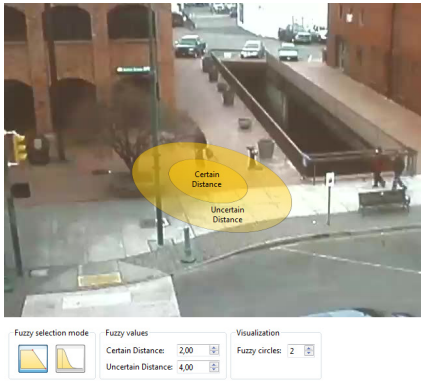
Botchen *et al.*, 2008

Visual Analytics



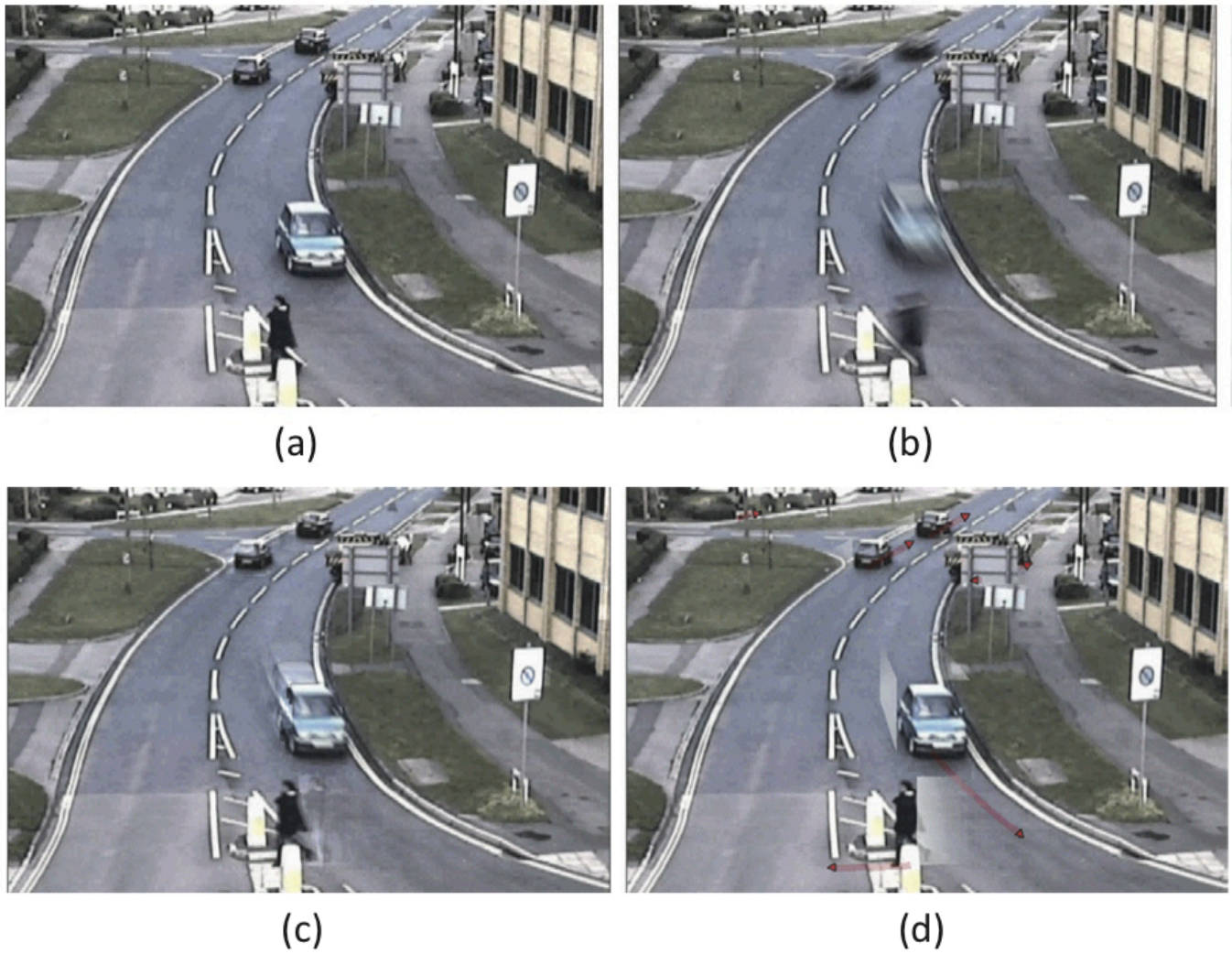






Höferlin *et al.*, 2011 (JOSIS)

Fast-Forwarding through Video

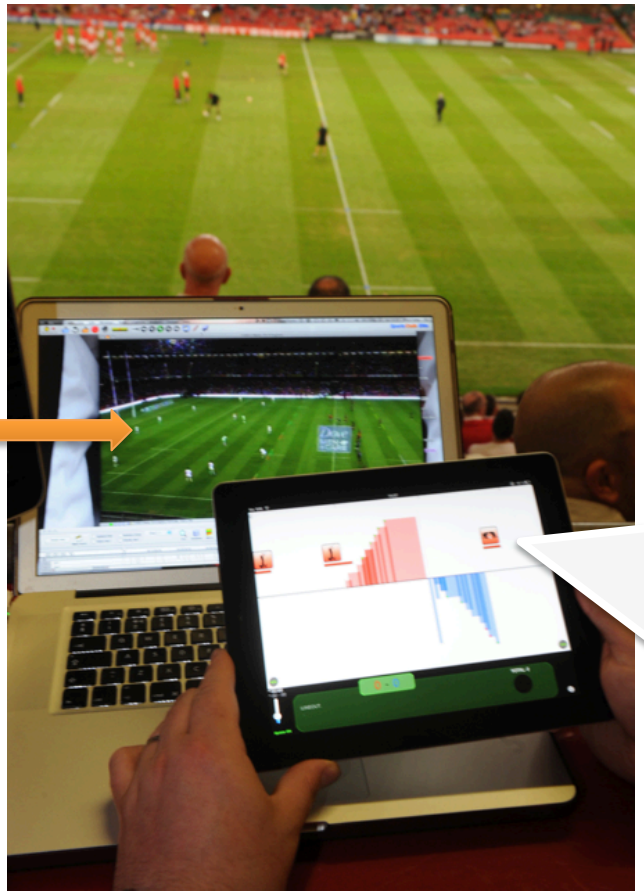


Höferlin *et al.*, 2012 (TVCG)

Further Extraction: Glyph-based Summarization

- Summarizing a rugby match

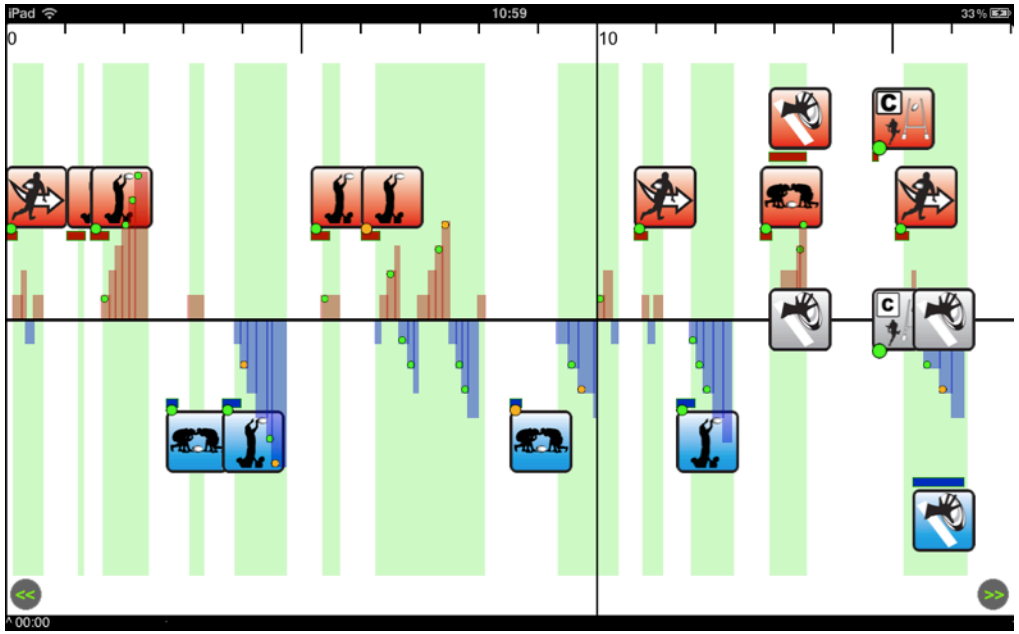
Context

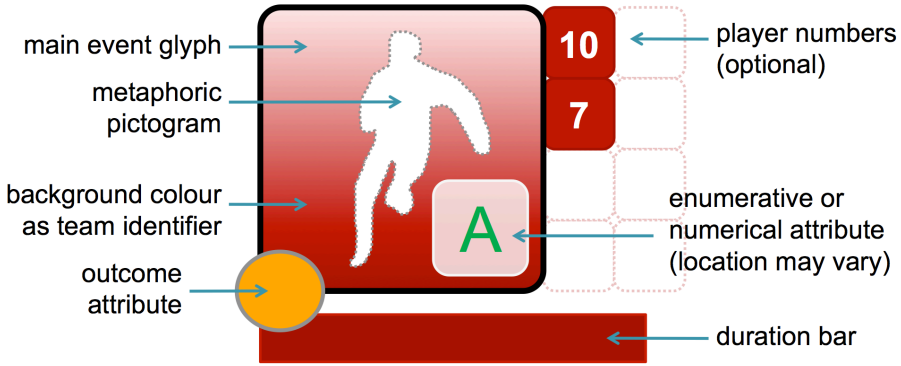


Legg *et al.*, 2008

Extraction

Glyph-based Summarization

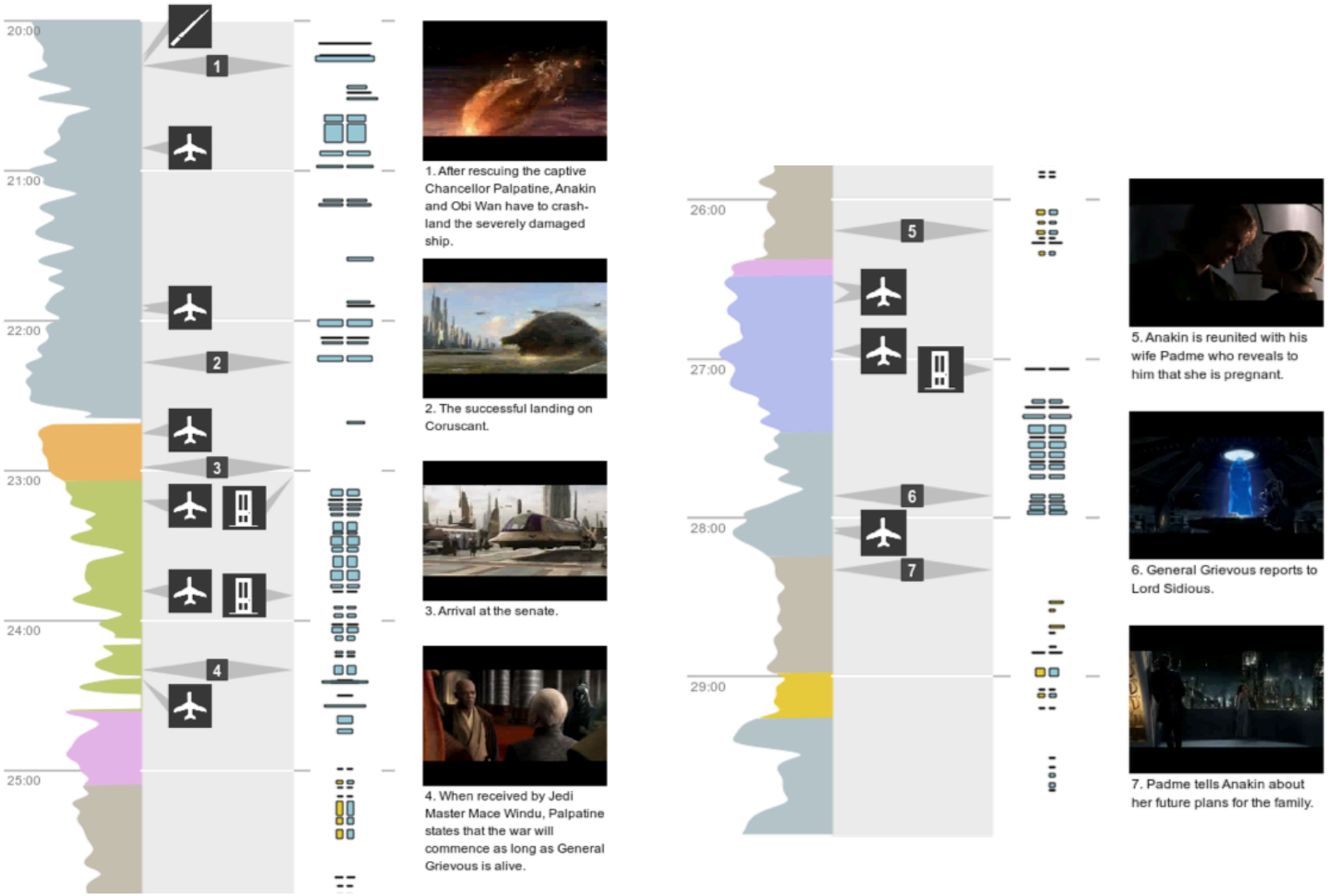




Utilizing the Audio Channel

Höferlin *et al.*, 2011 (ICAD)

Summarizing Audio



Jänicke *et al*. *2010*