A Best-Next-View-Selection Algorithm for Multi-View Rendering

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Multi-View Display

- Increasing number of views
- Increasing size of the displays
- 230,000 pixel
- 50,000 different views per display element

Picture of a multi-view display (1 m²)
Video: Multi-View Display
Overview: Display Element

- Each display element works like a projector
- 2D parallax
- ~ 50,000 views
- One image per display element
- Position dependent overlay of the projections yield the final image

Sketch of one display element
Next-Best-View Selection

Problem:
• Rendering of 230,000 images
  ➢ Reduce number of views

Solution:
Use
• Color and
• Depth images
to render all views with IBR
Next-Best-View Selection

Regular sampled viewpoints:

- Background is sampled often
- Non-overlapping FOV near display plane may occur

- Missing geometry at foreground objects

Solution:

- Use NBV algorithm to select key frames
Overview

Input
• Depth images

Approach
• Geometric model of the scene

Criteria
• Distance to the display’s zero plane
• Size of the display

Output
• Ordered list of the viewpoints, according to their importance

➢ For details visit me at my poster
Results

Full-sized display has 230,400 display elements

1. Sub-sampling:
   - Every 4\textsuperscript{th} display element used for viewpoint selection
   - Down-sized display with 14,400 display elements for evaluation

2. NBV is used to further reduce the number of input images
Results: Completeness of Geometry

Contribution per input image:

- Only small contribution to the geometry after the first 100 images

Overall completeness:

- Geometry is complete at image number 4,762
- Good interpolation results can be achieved with less than 100% complete geometry

* Logarithmic scale
Results: View Location

- The algorithm favors object boundaries
- Foreground objects are favored according to the weighting function
- Most important key frames are in the corners

- 393 most important key frames
- Viewpoints of marginal interest are omitted in the picture
Results: Regular Vs. Best-Next-View

Virtual view of the display

- Close-up view of the central foreground region
- Regular sampled viewpoints vs. Best-Next-Views

Regular sampled viewpoints

- Missing geometry near the display’s zero plane

Best-Next-View selection

- Fewer input images needed for complete geometry
Conclusion and Future Work

- Best-next-view selection algorithm for multi-view displays
- Order viewpoints by their importance for an IBR algorithm
- Criteria are the distance to the display’s zero plane and the display’s size
- Criterion to measure the impact of missing geometry
Thank you for your attention

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