Understanding the Impact of Inter-Lens and Temporal Stereoscopic Video Compression

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Motivation

- 3D (stereo) video is here
Problems

- Experience is highly view dependent

- Mismatch between depths on converged image and edges that are supposed to be at the same depth
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- Experience is highly view dependent
- Mismatch between depths on converged image and edges that are supposed to be at the same depth
- Eyes need to actively track over time
Observations

- Producers of 3D content have certain depth and presentation in mind
  - Need to be able to tailor display with these intents in mind

- View scenarios can be highly varied
  - Handheld – 18” away
    - iPhone
    - Tablet
  - Displays
    - 52” TV, 10-12 feet away
    - 30” display, 18” away
The future

- Multi-headed stereoscopic cameras
Systems support for multi-lens

- **The process**
  - Capture image-sets of data
  - Calculate disparity (for use in display)
  - Compress

- **The questions**
  - Can you leverage disparity calculation in motion search?
  - What is the best way to compress the video?
Related work

- MVC Encoding
  - Generic multiview video codec
  - Main focus is compression efficiency
Temporal Compression

Inter-lens Compression
The sequences
Inter-lens compression

![Graph 1: Motion Vector (Pixels) vs. Percentage for Cpass-11x, Drive-11x, and Pier-11x]

![Graph 2: Motion Vector (Pixels) vs. Percentage for Cpass-11y, Drive-11y, and Pier-11y]
## Inter-lens compression

<table>
<thead>
<tr>
<th>Movie</th>
<th>Skip</th>
<th>Intra</th>
<th>Zero</th>
<th>Pred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cpass</td>
<td>11.5%</td>
<td>0.22%</td>
<td>36.94%</td>
<td>51.33%</td>
</tr>
<tr>
<td>Drive</td>
<td>6.73%</td>
<td>0.79%</td>
<td>41.12%</td>
<td>51.36%</td>
</tr>
<tr>
<td>Pier</td>
<td>25.34%</td>
<td>2.17%</td>
<td>5.40%</td>
<td>67.10%</td>
</tr>
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Temporal compression

![Graphs showing temporal compression data for different motion vectors with labels Cpass-11x, Drive-11x, Pier-11x.](image)
## Inter-lens compression

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<td>52.31%</td>
<td>0%</td>
<td>34.46%</td>
<td>13.22%</td>
</tr>
<tr>
<td>Drive</td>
<td>17.8%</td>
<td>2.87%</td>
<td>20.32%</td>
<td>59.01%</td>
</tr>
<tr>
<td>Pier</td>
<td>55.44%</td>
<td>0.33%</td>
<td>23.17%</td>
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Conclusion

- We believe multi-lens stereoscopic will be the future

- Lots of work
  - Temporal compression is still king particularly for still camera images
  - Inter-lens compression shows promise for more dynamic video motion
  - May change with more densely space lens
Questions?