View Interpolation

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Outline

1. Basic Results
2. Algorithm
3. Results
4. Explanation of Results
5. Future Work
Basic Results

Basic Results

Basic Results
Algorithm Overview

1. Find fundamental matrix
2. Rectify
3. Compute disparity map
4. Interpolate (spatial, color)
5. Un-rectify
Epipolar Geometry

\[ X \]

\[ X_a, X_b, X_c \]

\[ O_L, O_R, e \]
Find Fundamental Matrix

- Relates coordinates from one image to coordinates in the other image

L original  R original
Image Rectification

Image Rectification
Disparity Estimation

Disparity - the difference in image location of an object seen by the left and right camera
Disparity Estimation

LR

RL
View Interpolation
View Interpolation
Un-Rectification

- **Step 1**: originals
- **Step 2**: pad
- **Step 3**: rectify
- **Step 4**: interpolate content
- **Step 5**: interpolate corner coordinates
- **Step 6**: un-rectify
- **Step 7**: remove padding
- **Step 8**: interpolated view
Results
Results
Results
Results
# Results

Run time (sec)

<table>
<thead>
<tr>
<th>Scene:</th>
<th>Color</th>
<th>Grayscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start to finish for $v = 0.5$</td>
<td>3.05</td>
<td>1.86</td>
</tr>
<tr>
<td>View Interpolation &amp; Un-Rectification</td>
<td>0.246</td>
<td>0.156</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step(s) in code</th>
<th>Color</th>
<th>Grayscale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Book</td>
<td>Head</td>
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<td></td>
<td>Book</td>
<td>Head</td>
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</tbody>
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Results
**Explanation of Results**

- Fails when two images have extremely different positions (high disparity)
- Worst at $v = 0.5$
Future Work

- Disparity map improvement
- Optical flow to replace disparity map process
- Create slider to adjust intermediate frame position interactively
- Alternative to padding images
- Convert to C++ for real time performance
Questions/Comments?