4D Temporally Coherent Light-field Video

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Problems

Existing light-field methods suffer from following limitations:

• Limited to static scenes;

• Requirement to acquire a dense scene representation;

• Large amount of data;

• Lack of temporal coherence;

• Challenges in storage, compression and editing.
Contributions

- 4D Temporally coherent dynamic light-field video
- EPI from sparse light-field video for spatio-temporal correspondence
- Sparse-to-dense light-field scene flow exploiting EPI image
- Efficient representations to facilitate editing for live action VR
4D Temporally coherent light-field video

- Light-field video
- Mesh
- Key-frame detection
- 4D Temporally coherent light-field video
- Light-field scene flow
- Sparse temporal correspondence
Light-field scene flow
Light-field scene flow

\[ E(M) = \sum \alpha E_L(p, m_p) + \beta E_C(p, m_p) + \eta E_R(p, m_p) \]

where M is the flow, p is the pixel and \( m_p \) is the flow at that pixel

- **Light-field consistency exploiting EPI image information.**
Light-field scene flow

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- **Appearance consistency constraint by sparse temporal matches.**

Sparse temporal correspondence tracks
Light-field scene flow

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- **To enforce motion smoothness and handle occlusions in areas with low confidence**

Input video

Light-field scene flow
4D Temporally coherent light-field video
Results

- Light-field video
- Camera 2 video
- 4D temporally coherent light-field video
- Light-field scene flow
Results

Light-field video

Camera 2 video

4D temporally coherent light-field video

Light-field scene flow
Conclusions

• 4D Temporally coherent dynamic light-field video
• EPI from sparse light-field video for spatio-temporal correspondence
• Sparse-to-dense light-field scene flow exploiting EPI image
THANKS FOR YOUR ATTENTION!

Walking Dataset
Input light field video