公开课视频回放 | 基于RGBD和IMU的实时室内SLAM及三维重建

欢迎加入直播交流QQ群（617030152），以后的直播通知、资料会第一时间分享到群里。
以下是部分PPT内容。

清華大學 Tsinghua University

Real-time Localization and Dense Mapping with Fast Sensor Motion

Zunjie Zhu, Feng Xu, Chenggang Yan, et.al.

Intelligence Information Processing Lab,
Hangzhou Dianzi University

School of Software, Tsinghua University

杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

清華大學 Tsinghua University

OVERVIEW

- Why fast?
- How fast?
- Problems
- Our method
- Future work

杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

计算机视觉life

WHY FAST

清華大學 Tsinghua University

- Augmented Reality & Mixed Reality
  - Unconstrained user action
- Robotics
  - High efficient work
- Other applications
  - Fast Reconstruction
  - Towards Robust SLAM

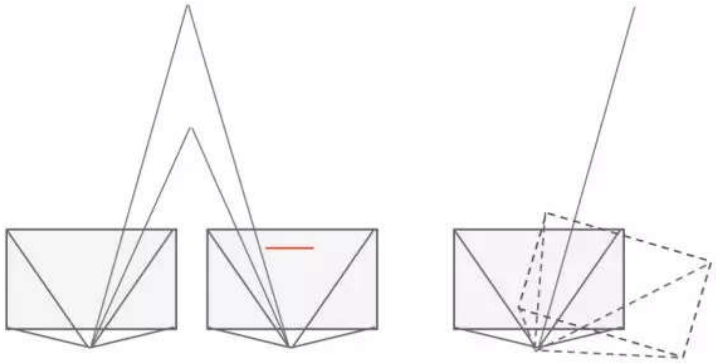


杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

HOW FAST

清華大學 Tsinghua University

- Motion blur & Rolling Shutter
  - Relative motion during exposure time
  - Distance & motion type
  - ~~image resolution~~



- Linear velocity: 3 m/s
- Angular velocity: 360 deg/s
- FPS: 30Hz

Related motion:

- 10 cm/frame
- 12 deg/frame

杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

计算机视觉life

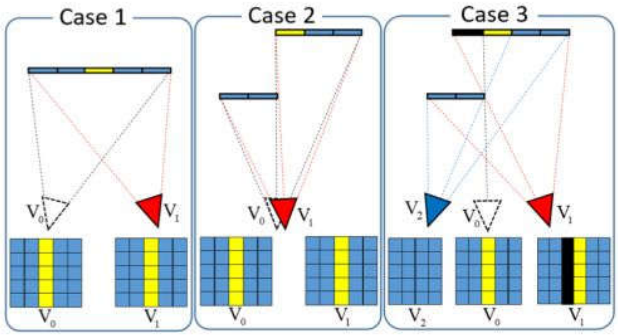
PROBLEMS

清華大學 Tsinghua University

- Reduce exposure time
  - Lower brightness
  - Worse SNR

20Hz 40Hz 60Hz

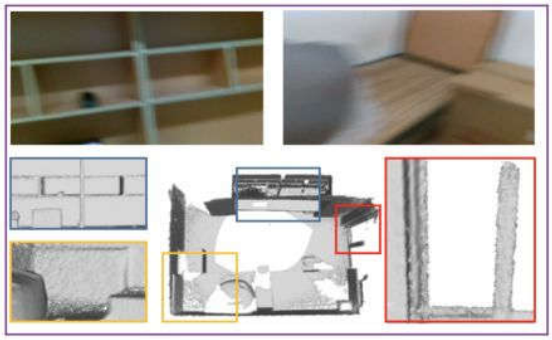
- Feature point method
  - Insufficient feature
  - Miss & False match
- Direct method
  - Shrink Effect & Extend Effect (SE Effect)
- ICP algorithm
  - Local optimum



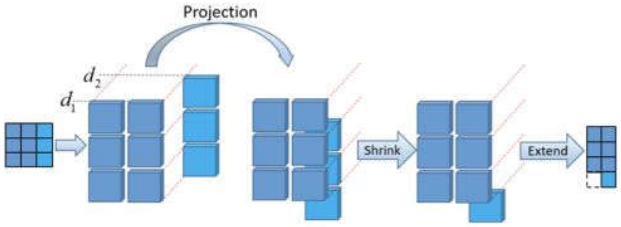
杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

OUR METHOD

清華大學 Tsinghua University



- Geometry-aware patch deformation



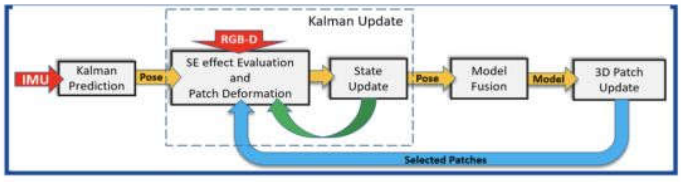
- Input: RGB-D-Inertial

IMU

Linear acceleration:
ax ay az

Angular velocity:
qx qy qz w

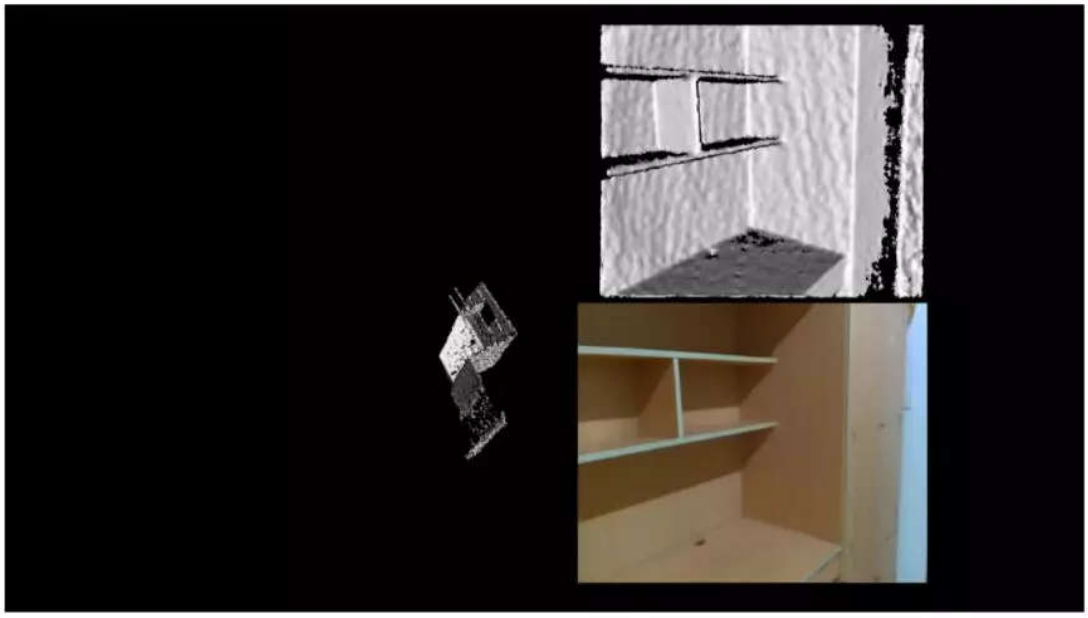
- Iterative EKF
  - Iteratively update deformed patches



杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

RESULTS

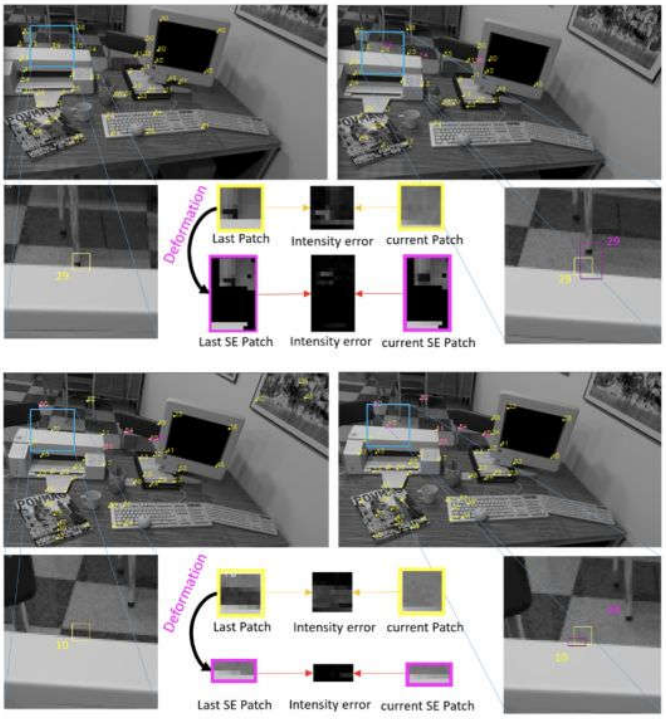
清華大學 Tsinghua University

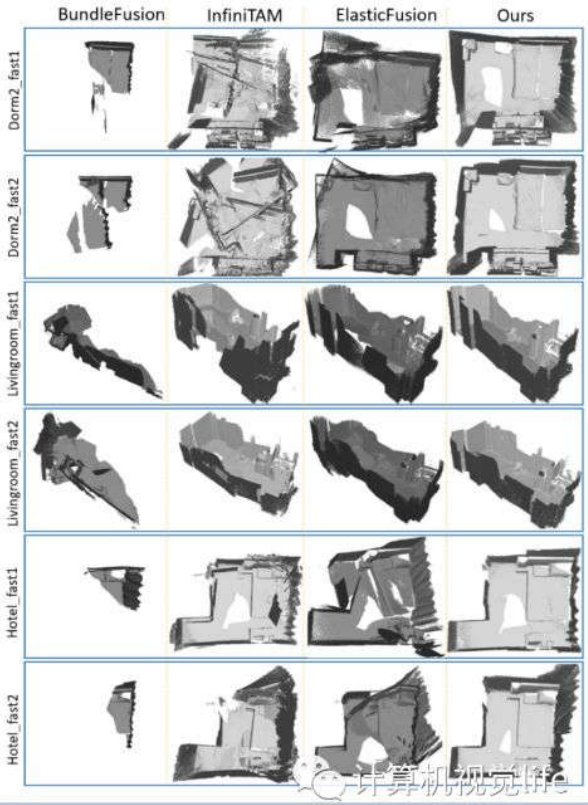


杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

清華大學 Tsinghua University

RESULTS





杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

计算机视觉life

FUTURE WORK

清華大學 Tsinghua University

- Loop Closure
  - Loop detection
  - Loop correction
- Deblur
  - Video
  - Texture

杭州電子科技大學 HANGZHOU DIANZI UNIVERSITY

THANKS!