Reconstructing Building Interiors from Images

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Reconstruction & Visualization of Architectural Scenes

• Manual (semi-automatic) approaches
  – Google Earth & Virtual Earth
  – Façade & CityEngine
Reconstruction & Visualization of Architectural Scenes

- Manual (semi-automatic) approaches
  - Google Earth & Virtual Earth
  - Façade & CityEngine
- Automatic approaches w/ computer vision
Reconstruction & Visualization of Architectural Scenes

What about indoor scenes?
Reconstruction & Visualization of Architectural Scenes

What about indoor scenes?

Relatively little attention given to indoor scenes
What we do

• Fully automatic system
  – Starts from images
  – Reconstructs a 3D model
  – Provides real-time interactive visualization
System pipeline
System pipeline

Structure-from-Motion
(Camera pose estimation)
System pipeline

Structure-from-Motion
(Camera pose estimation)
System pipeline

Multi-view Stereo
(dense structure reconstruction)
System pipeline

Multi-view Stereo
(dense structure reconstruction)
System pipeline

Images

Camera pose estimation

Dense reconstruction
System pipeline

Mesh fitting

Images

Camera pose estimation

Dense reconstruction
System pipeline

Images

Camera pose estimation

Dense reconstruction

Mesh fitting
System pipeline

Image-based rendering
Image-based rendering

View point
Image-based rendering

Reconstructed surface model

View point
Basic Movement

Translation

Reconstructed surface model
Basic Movement

Translation

Reconstructed surface model
Basic Movement

Panning

Reconstructed surface model
How it actually works

Input image

Input image

Input image
How it actually works

Automatic snapping
Gallery: 492 images - 2 Mpixels
Demo
Recap, Applications & Future work

• Fully automatic system
  – From images
  – To realistic visualization/virtual exploration
Recap, Applications & Future work

• Fully automatic system
  – From images
  – To realistic visualization/virtual exploration

• Scaling up to
  – A whole building with multiple floors
  – Internet community photo collections

• Google streetview for indoor scenes
Thank you - Any questions?

Gallery: 492 images - 2 Mpxels
# Running Time

Running time of 4 steps [min]

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<th>Kitchen (22 images)</th>
<th>Hall (97 images)</th>
<th>House (148 images)</th>
<th>gallery (492 images)</th>
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