展示數位典藏之影像型虛擬實境技術發展與整合
Outline

• Introduction
• Panoramas
• Object Movies
• Augmented Panoramas
  – Cuboid-Based Approach
• Applications
Introduction

DOS \rightarrow Windows \rightarrow ???

The Ultimate Human-Computer Interface

VIRTUAL REALITY

Computer Graphics \rightarrow Computer Vision
Image-based VR *versus* Geometry-based VR

**Geometry-based VR**
- 3D object models
- (+) any views, stereo
- (-) complex in modeling
- (-) scene-dependent rendering speed

**Image-based VR**
- images from images
- (+) simple and fast, photo-realistic
- (-) limited viewpoints (non-stereo)
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Panoramas
Result after Stitching
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Object Movies – Acquisition

rotation center ($C_o$)

optical-axis

tilt-axis ($\Phi$)

pan-axis ($\theta$)

acquisition setup
Object Movies – Indexing

3D configuration of views
Object Movies – Indexing

ORF (Object Reference Frame)
Object Movies – Interactive Rendering

ORF (Object Reference Frame)

θ = 0, ϕ = 0

θ = 15, ϕ = 12

θ = 30, ϕ = 12

θ = 0, ϕ = 24

θ = 15, ϕ = 24

θ = 30, ϕ = 24

θ = 0, ϕ = 0

θ = 15, ϕ = 0

θ = 30, ϕ = 0

observation direction

\( \vec{z}_O \)

\( \vec{y}_O \)
Example
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Object Movies + Panoramas

- Insert a set of 2D images (i.e., an interactive object movie) to a panoramic 2D background image.
- Maintain spatial coherence and generate convincing shadows.
- Provide an easy-to-use authoring tool.
- A purely image-based approach.
Goal

Panorama

Object Movies
Application to Augmented Panoramas

- Intrinsic parameters is known for Panoramas
  - require only a trihedral, i.e., only 4 points
right-hand rule

left-hand rule
The Three Stages for Integration

**Insertion** (interactive)
- Select a SRF (Shadow Reference Frame)
- Insert the object movie by referring to SRF

**Rendering**
- Object layer
- Shadow layer
- Background layer

**Refinement** (interactive)
Demo Clips

– Authoring phase

– Browsing phase
Applications

- Digital Archives (Virtual Museum)
- E-Commerce (Virtual Mall)
- Interior Design, Landscape Design
- Virtual Studio
- Computer Games
- GUI for Data Management