

Image-based Modeling and Rendering

0. Overview

Course no. ILE5025

National Chiao Tung Univ, Taiwan

By: I-Chen Lin, Assistant Professor

About the course

- Course title:
 - Image-based Modeling and Rendering (IBMR)
- Lectures:
 - EC016, 13:30~15:20(Tues.); 9:00~9:50(Fri.)
- Pre-requisites:
 - Computer programming skills in C/C++.
 - Basic data structures.
 - Introduction to computer graphics.
- Teacher:
 - I-Chen Lin (林奕成), Assistant Professor
 - Email: ichenlin@cs.nctu.edu.tw
 - Office: EC 704 (工程三館)

About the course (cont.)

- TAs:

- 江國豪
- Office: EC 229B
- Phone ext: 56676

- Course web page:

- <http://caig.cs.nctu.edu.tw/course/course.html>

- Text book:

- N/A
- (To be published) Image-Based Rendering by Heung-Yeung Shum, Shing-Chow Chan, Sing Bing Kang, 2006, Springer.

About the course (cont.)

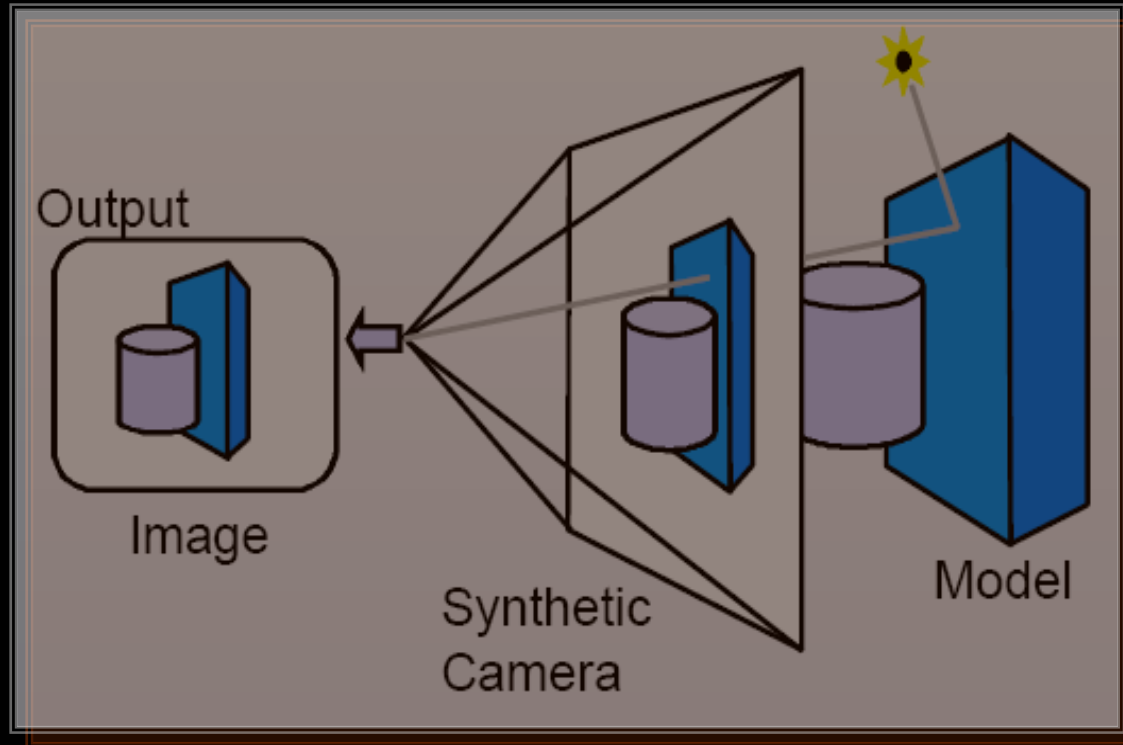
■ Reference:

- *Proceedings of ACM SIGGRAPH.*
- *Image-Based Modeling, Rendering, and Lighting, SIGGRAPH'99 Course Notes.*
- ACM Trans. Graphics (TOG)
- IEEE Computer Graphics and Applications.(CG&A)
- IEEE Trans. Visualization and Computer Graphics.(TVCG)

- Eurographics Symposium on Rendering (EGSR)

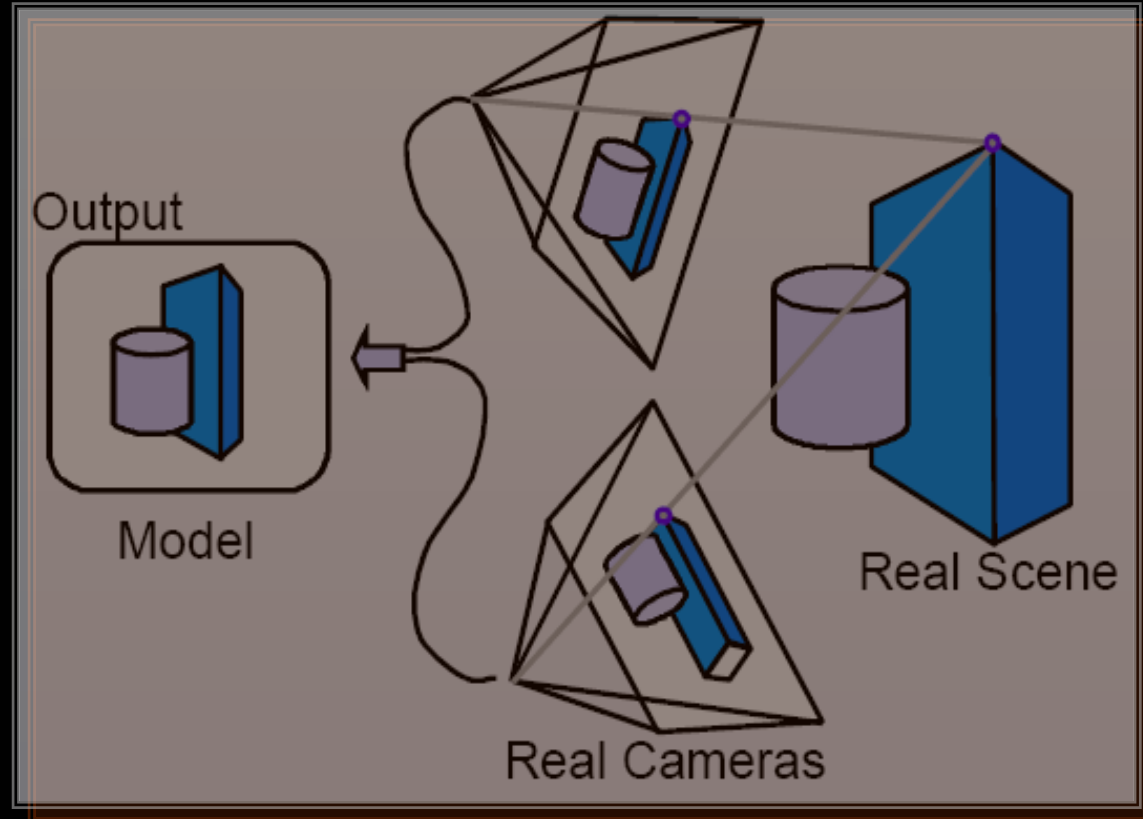
- Prof. C.F. Chang (NTHU), Image-based rendering course notes.
- Prof. S. Seitz and P.Heckbert (CMU), Image-based modeling and rendering course notes.

Computer Graphics



Figures from SIGGRAPH'99 Course Notes "IBMR"

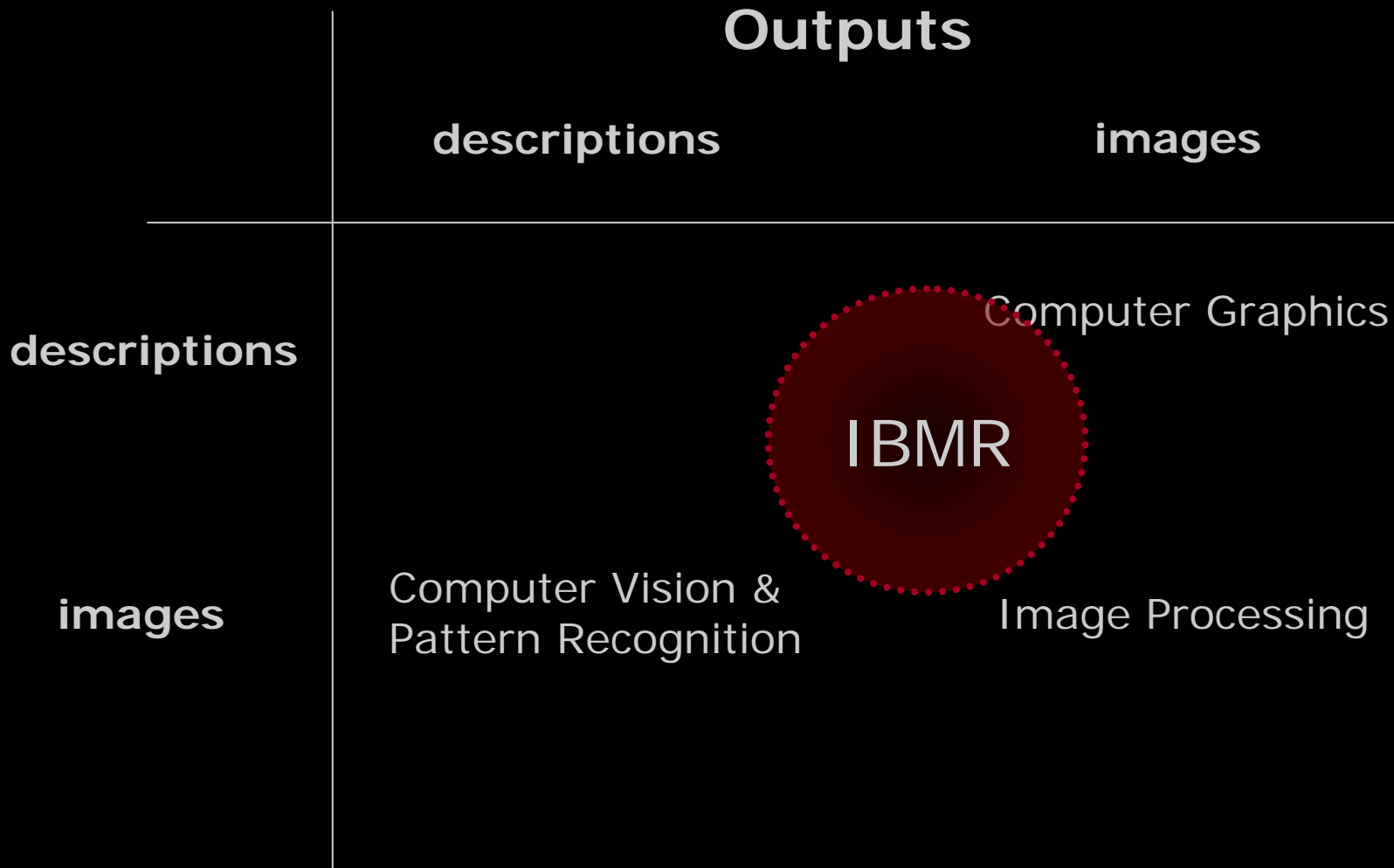
Computer Vision



Figures from SIGGRAPH'99 Course Notes "IBMR"

Graphics and related fields

Input



What's IBMR?

- Can we model this scene?
 - From viewpoints of traditional graphics...



What's IBMR? (cont.)

- Can we model this scene?
 - From viewpoints of computer vision...



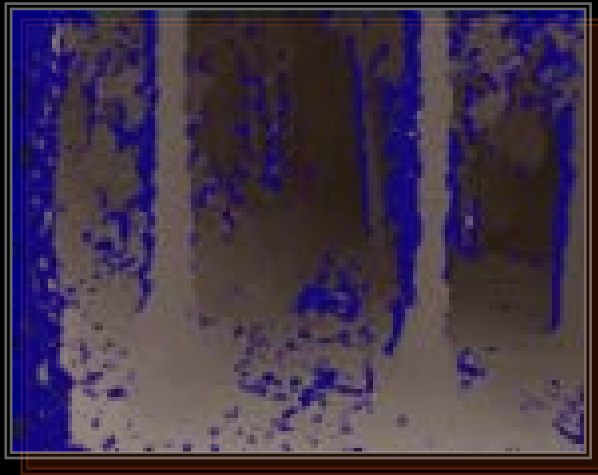
Left view



Right view

What's IBMR? (cont.)

- Can we model this scene?
 - With assistance of computer vision...



A depth image (map) from the stereo image pair



Synthetic view

Image-based Modeling and Rendering

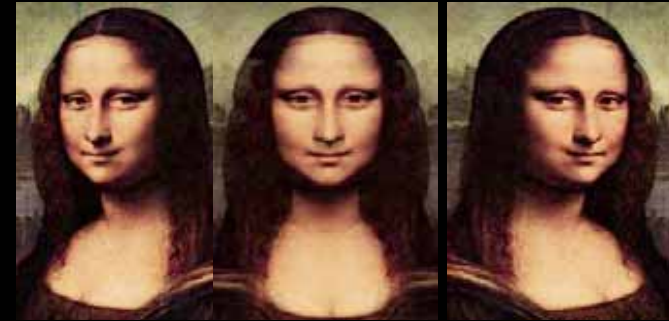
Image-based Modeling

Image-based Rendering



Syllabus

- Introduction.
 - What are image-based techniques?
 - Basic 3D graphics.
- Images
 - Image warping and morphing
 - Environment mapping
 - Image mosaics



S.Seitz et al. "View Morphing", SIGGRAPH'96

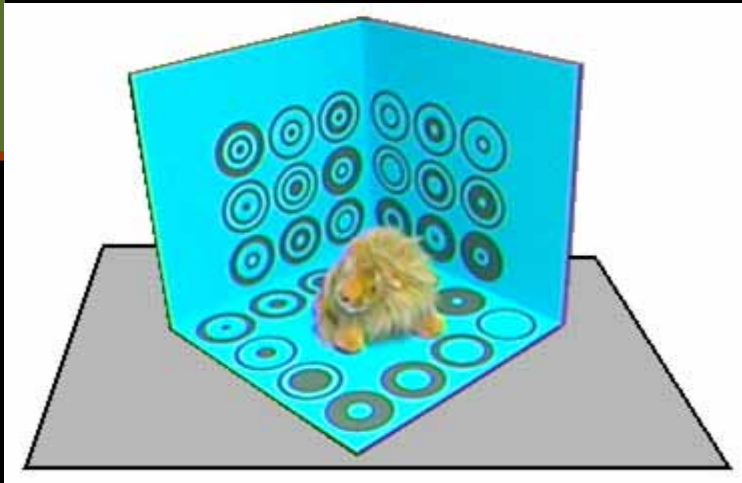


E.Chen, "QuickTime VR", SIGGRAPH'95

Syllabus (cont.)

- Depth images (2.5D)
 - Sprites
 - Layered depth images (LDI)

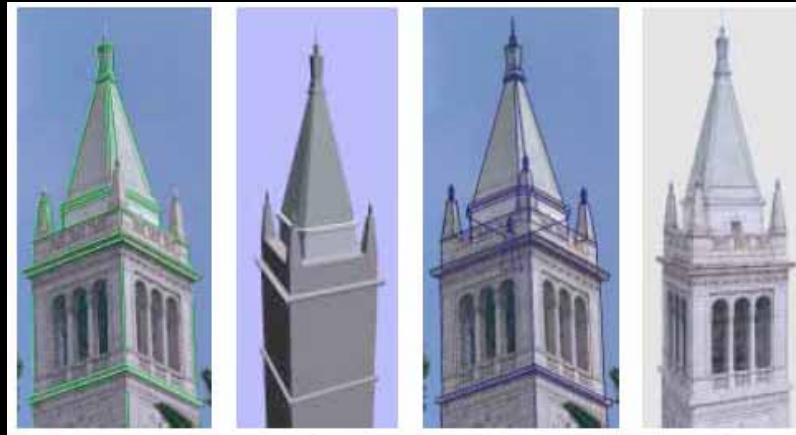
- Light field rendering & lumigraph



S.Gortler et al. "The Lumigraph", SIGGRAPH'96

Syllabus (cont.)

- Modeling
 - Acquiring geometry
 - Stereo, 3D scanning, photometric method
 - Visual Hull, hybrid approaches



P.Debevec et al. "Modeling and Rendering Architecture from Photographs", SIGGRAPH'96

Syllabus (cont.)

Advanced or related topics in IBMR

- Applications of IBMR in Human Animation



T. Ezzat, G. Geiger, and T. Poggio, "Trainable speech animation, Proc. ACM SIGGRAPH'02, pp.388-398.



Image-based lighting

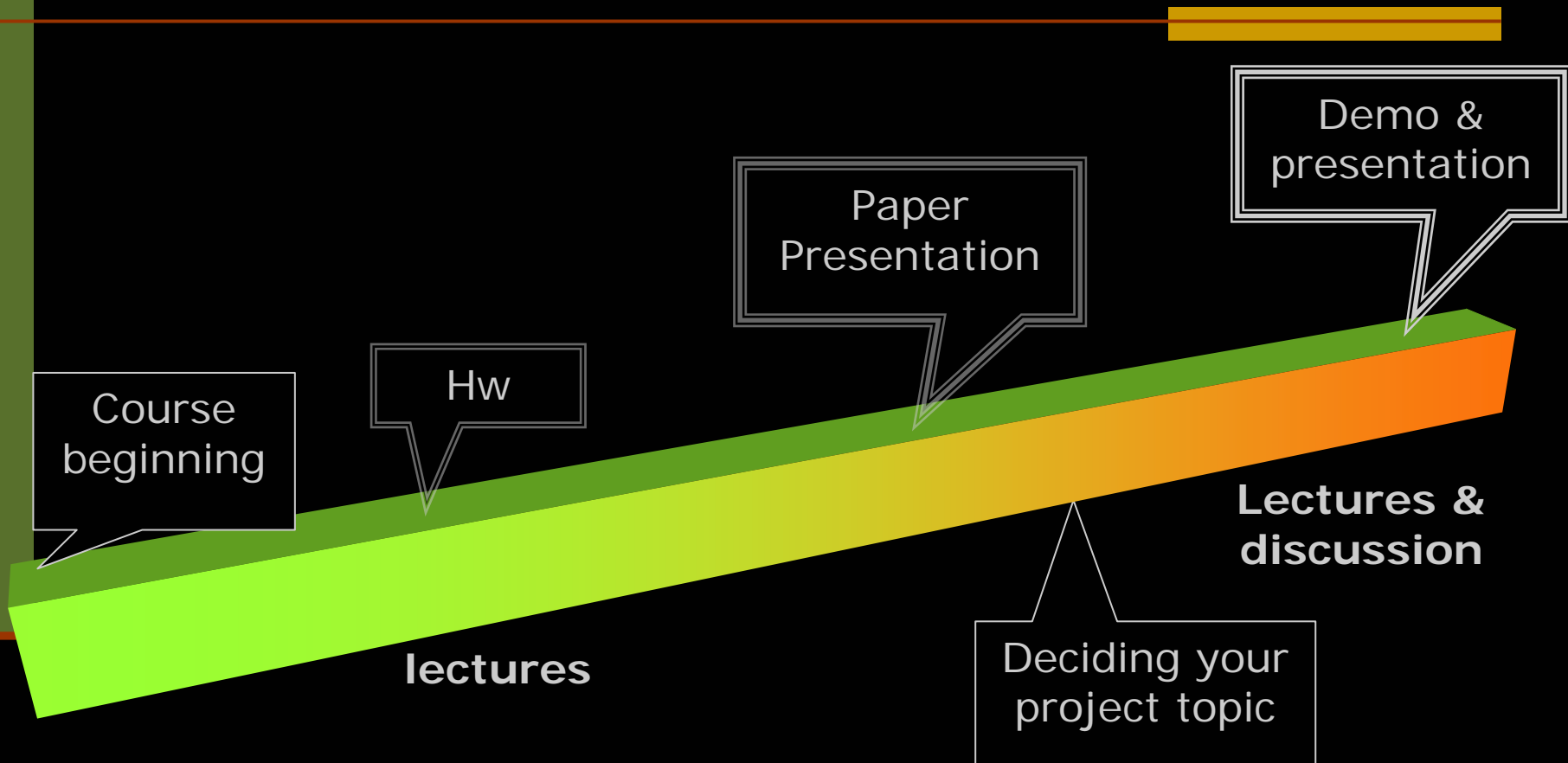


P.Debevec, "Rendering Synthetic Objects into Real Scenes", SIGGRAPH'98

About the course (cont.)

- Grades: (Temporarily)
 - Homework (30%)
 - Paper presentation (30%)
 - Term project (40%)
 - 1~2 members per group.
 - Demo systems & presentation.
 - Class participation (bonus)

The schedule



Conclusions

- New representations for 3D graphics
 - easy to acquire
 - allows efficient rendering
- scalable performance
 - depends on number of pixels rather than the number of geometric primitives
- Amenable to HW acceleration
- “IBMR techniques have become standard tools in filmmaking” (from SIGGRAPH'99 course notes)



Bullet time, motion picture "Matrix"

