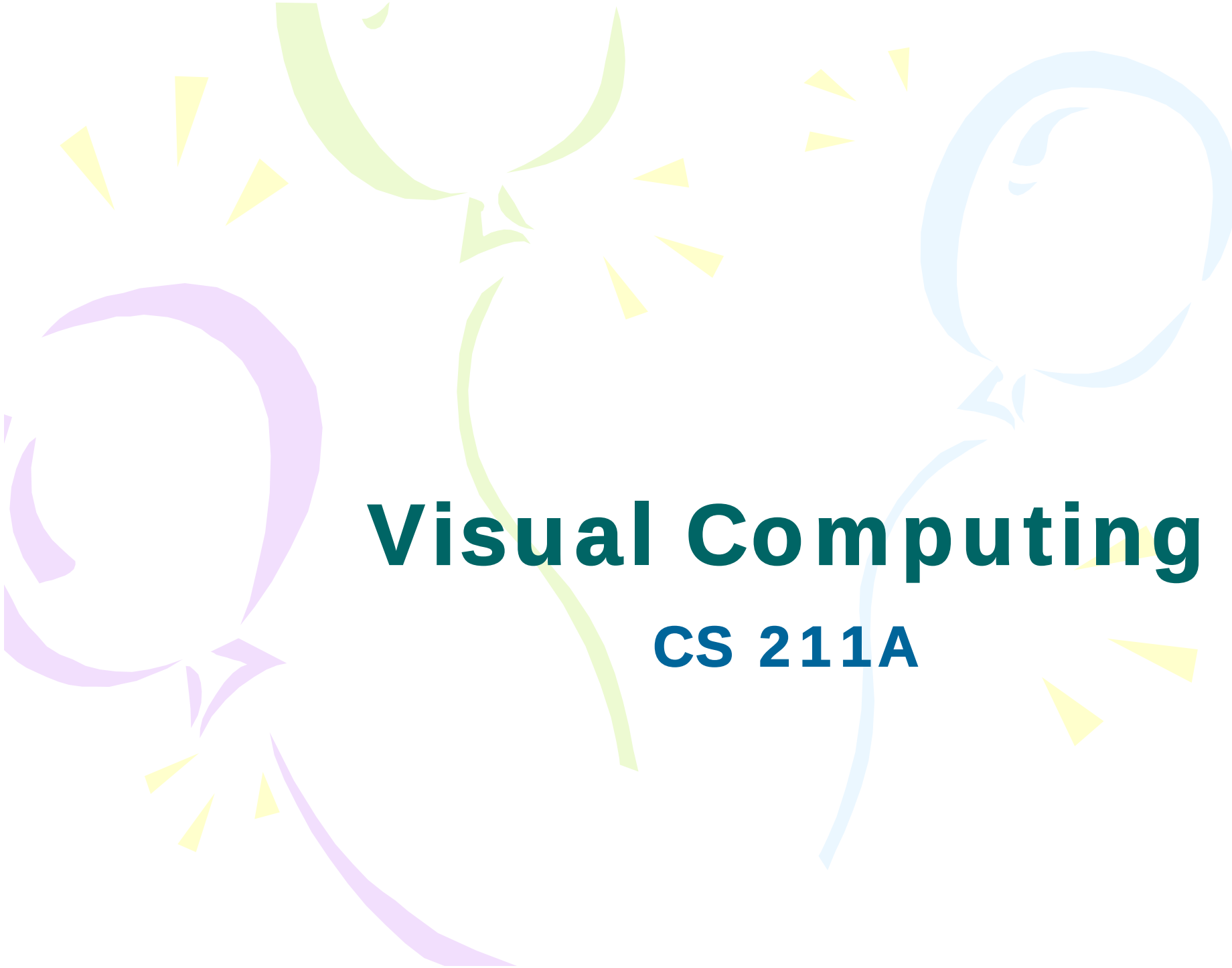


Visual Computing

CS 211A

The Course

- Introductory Graphics, Vision and Image Processing course
- Prerequisite for Advanced Graphics and Vision courses
- Visual Computing concentration

Course Format

- Lecture Format
  - Text Book: Intro to Visual Computing by A. Majumder and M. Gopi
- 4 Programming Assignments (3 people group)
  - IP, Vision, Graphics, Final project
- 1 Midterm and Final
- Use the noteboard effectively
- Schedule is online

Grading and Office hours

- Do not worry about grades
- Learning is the priority
- Tentative Policy
  - Programming Assignment – 20%
  - Midterm – 30%
  - Final – 50%
- Instructor Office Hours
  - Thursday – 3-4pm

Course Motivation

- What is Visual Computing?
  - Use of computing to perform the functions of the human visual system
- Traverses within several traditional domains
  - Computer Vision
  - Computer Graphics
  - Image Processing
- Addresses converging domains

Course Organization

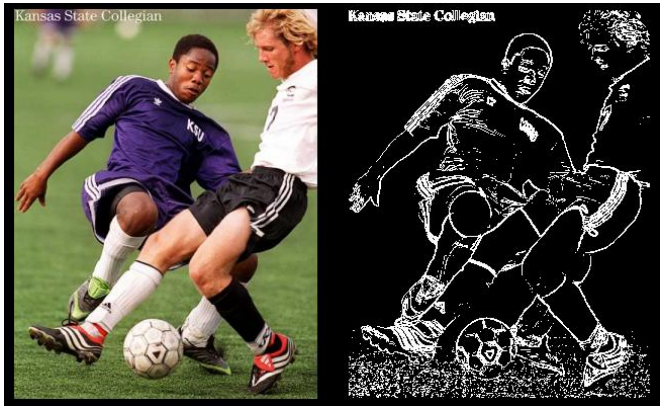
- Image-based visual computing
- Geometric visual computing
- Radiometric visual computing
- Visual content synthesis

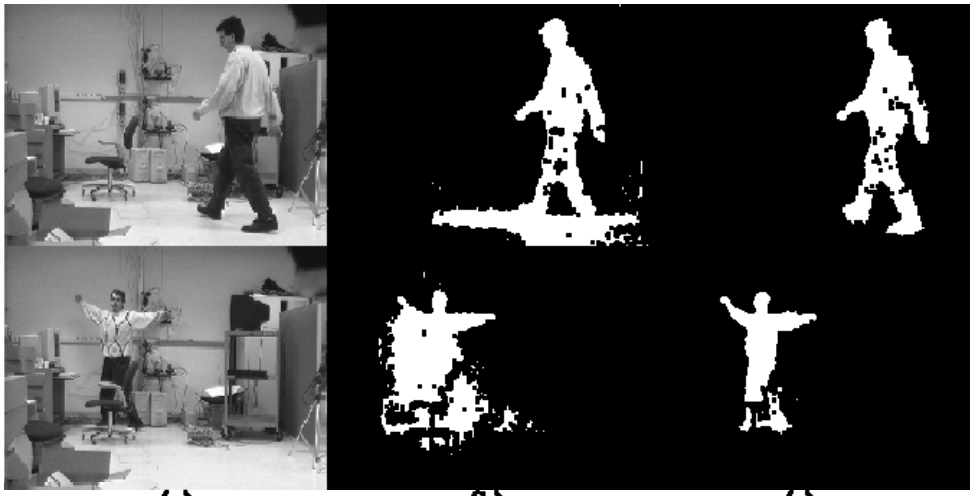
Course Organization

- Image-based visual computing
  - Low level vision in eye
- Geometric visual computing
  - Higher level vision
  - Combining information from two eyes
- Radiometric visual computing
  - Processing light and object interaction
- Visual content synthesis
  - Synthesize realistic 3D worlds

Image Based Visual Computing

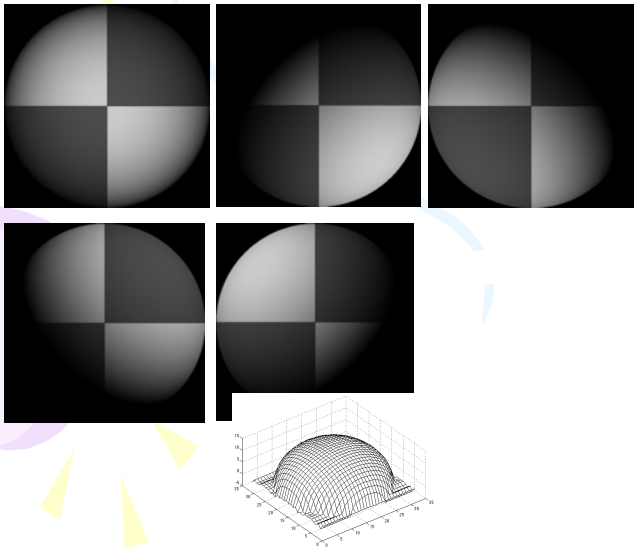
- Detecting features
- Background removal
- Image Segmentation

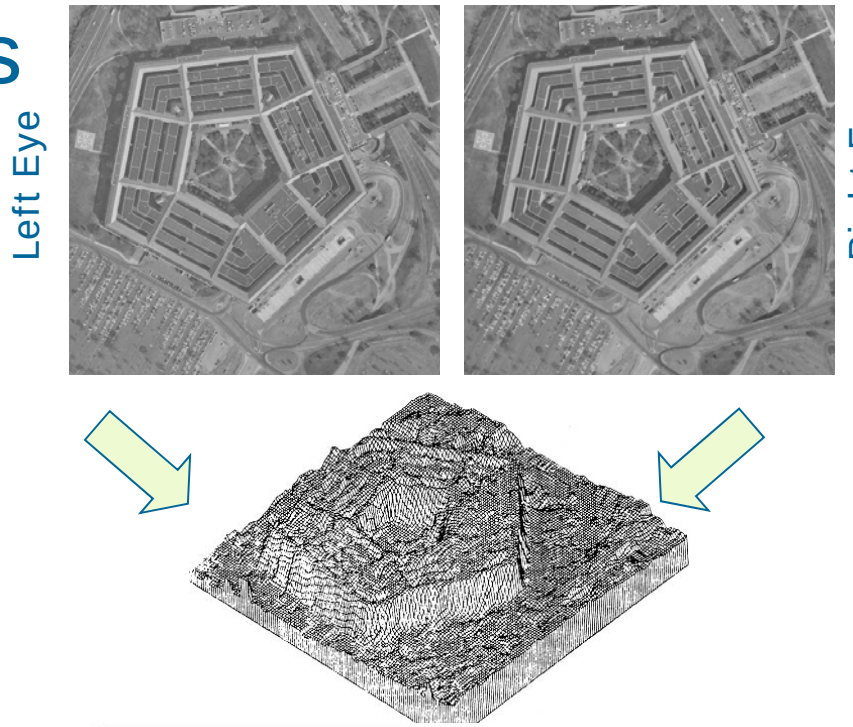


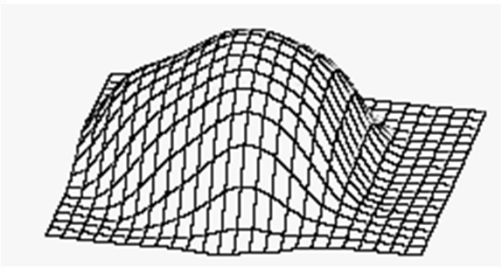


Geometric Visual Computing

- Detecting shapes
  - Binocular cues
  - Shading cues
  - Texture Cues
  - Motion Cues







Radiometric Visual Computing

- High dynamic range imaging

Sky
oversaturated

Ground
undersaturated

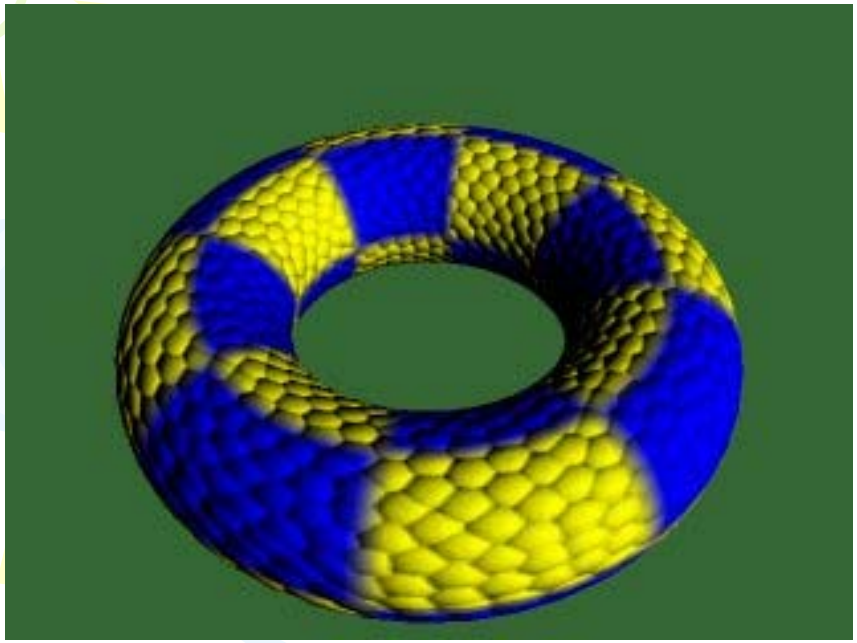
HDR
image

- Perceiving reflectances

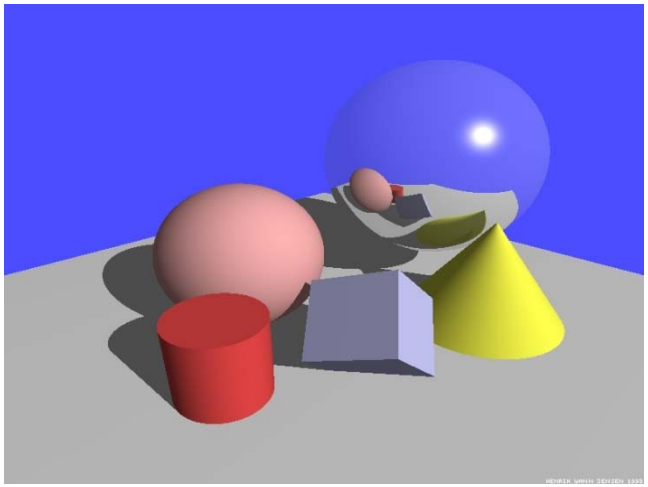
Visual Content Synthesis

- Can we reverse engineer?
  - Fool the eye? (e.g. Perfect Storm)
- Effects
  - Geometry
  - Lighting
  - Material
  - Motion
  - Trade off between time and quality

Bump and Environment Map



With more time…



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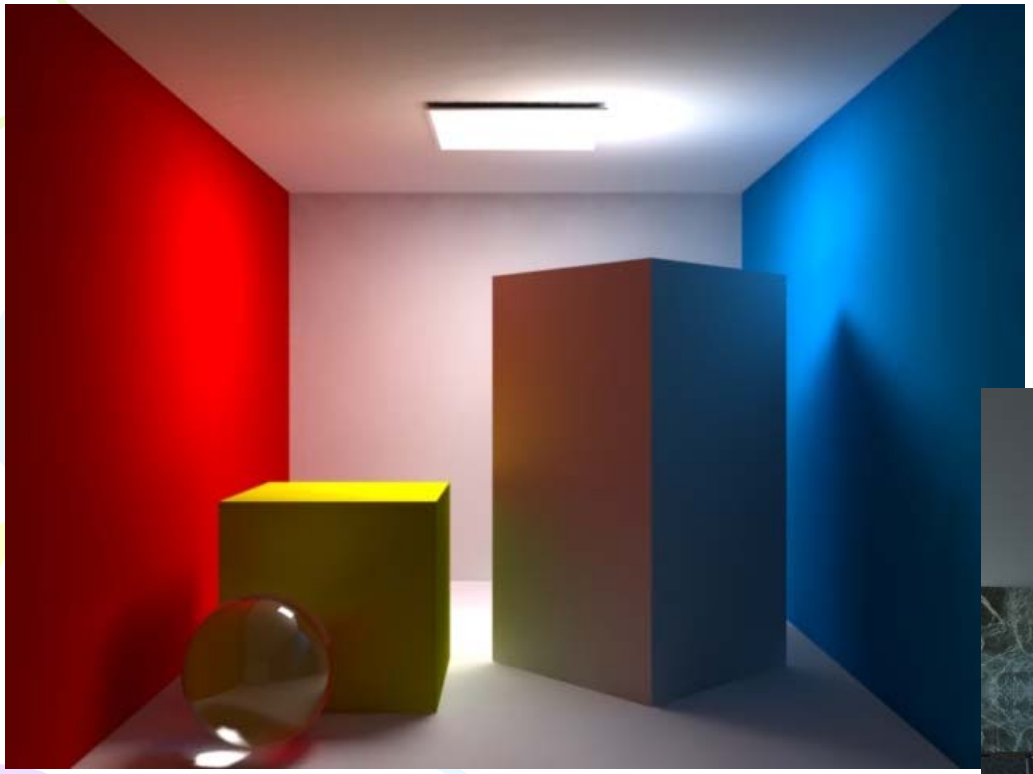


Materials: Subsurface Scattering

Materials: Transluscency

Different levels of subsurface scattering (increasing from left to right) on Venus

Merge real and synthetic

Show Fiat Lux

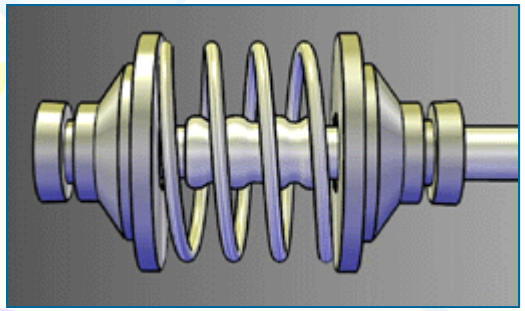
Simulation

Non Photorealistic Rendering

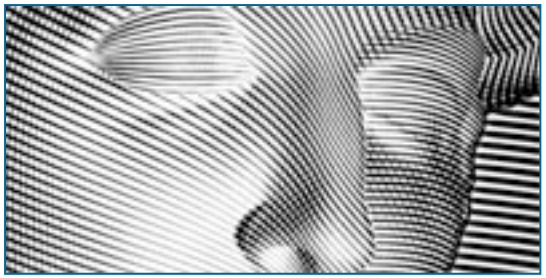
Photorealistic

Pen and Ink

Painterly Rendering



Illustrations



Dithering

Engraving

Fur and Grass

This class

- We will NOT learn ALL of these
- Provide you with the fundamentals so that you can learn all of these