Imatge Sintètica

Ray Tracing for Realistic Image Synthesis

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Lecture 6 - Final Projects

2017/2018

Class Outline
Lecture 6 - Final Projects

Last Class Summary
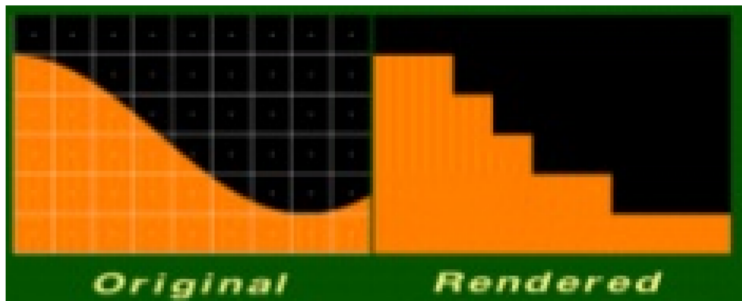
Aliasing

Projects

Next Classes

Last Class Summary

- We have learned what is the Global Illumination problem (GI)

- We have learned two strategies, based on the use of an ambient term, to provide an approximate solution to the GI problem

Section 2

Aliasing

Aliasing

▶ Sending a single ray per pixel might make us miss some features of the scene

Aliasing

▶ Such a loss of details, due to an insufficient number of samples per pixel is called aliasing
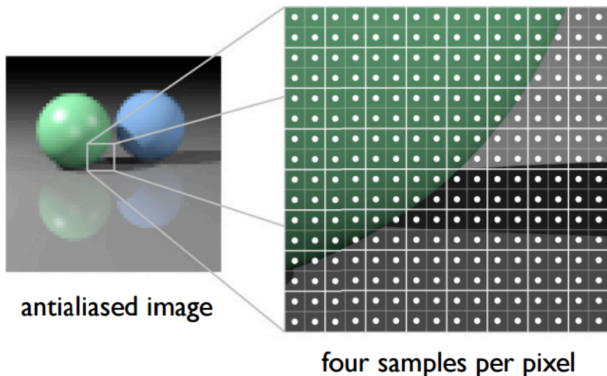
Aliasing

- Antialiasing consists in increasing the number of samples per pixel to capture the scene details

aliased image

one sample per pixel

Aliasing

- Antialiasing consists in increasing the number of samples per pixel to capture the scene details
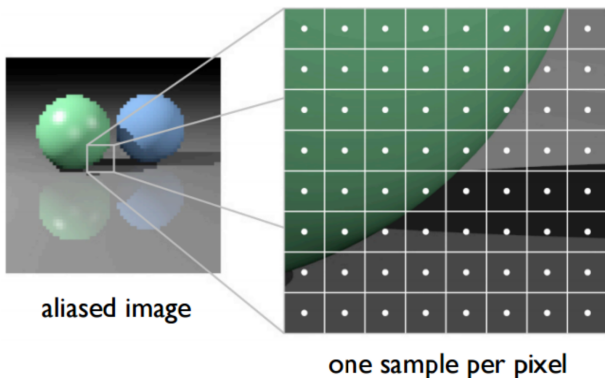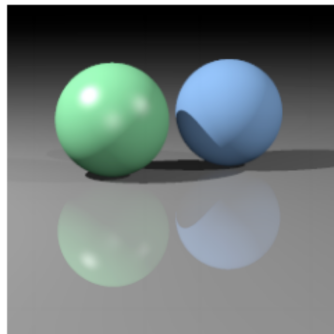

antialiased image

four samples per pixel

Aliasing

- Antialiasing increases image quality at the cost of a larger computational time
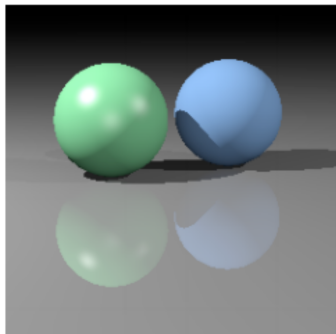
one sample/pixel

9 samples/pixel

Section 3

Projects

Project 1 - Ray Tracing with Complex Meshes

- Objective:
  - Make the ray tracer able to deal with richer shapes such as complex meshes composed of many triangles

- Challenges:
  - The ray traversal of the scene can quickly become extremely slow when the scene is composed of a large number of shapes

- Main steps:
  - Implement ray-triangle intersection
  - Use an existing OBJ loader to load a mesh to the ray tracer
  - Implement a simple ray-object acceleration technique (e.g., use a bounding box for the scene meshes)

Project 2 - Adaptive Sampling

- ▶ Objective:

  - ▶ Send more rays for those pixels for which the light is more difficult to compute

- ▶ Challenges:

  - ▶ Define a criterion for detecting which pixels require more rays

- ▶ Main steps:

  - ▶ Implement super-sampling (anti-aliasing) for all the pixels, leading to very long computation times

  - ▶ Implement a criterion so that only some pixels are super-sampled

Project 3 - Intersections with Other Shapes

- ▶ Objective:

  - ▶ Enhance the ray tracer with a richer set of shapes

  - ▶ E.g., Cylinder, cones, and more . . .

- ▶ Challenges:

  - ▶ Determine the ray-object intersection equations for the new shapes

- ▶ Main steps:

  - ▶ Decide the new shapes to be used

  - ▶ Implement the ray-object intersection

Project 4 - Soft Shadows

- ▶ Objective:
    - ▶ Implement light sources which have an area (as opposed to the point light sources we have seen in class)

- ▶ Challenges:
    - ▶ Find an appropriate description of these light sources
    - ▶ Find an appropriate way for sampling the visibility of the area light sources

- ▶ Main steps:
    - ▶ Identical to the Challenges

Section 4

Next Classes

A Glance on the Next Classes

- Till next Friday

    - Those who did not finish the assignments must finish them

- From next Friday on:

    - Work exclusively on the project

- **Recall**

    - In the last week you will have to make a demo and to present your project