

# Optimizing Photon Mapping Using Multiple Photon Maps for Irradiance Estimates

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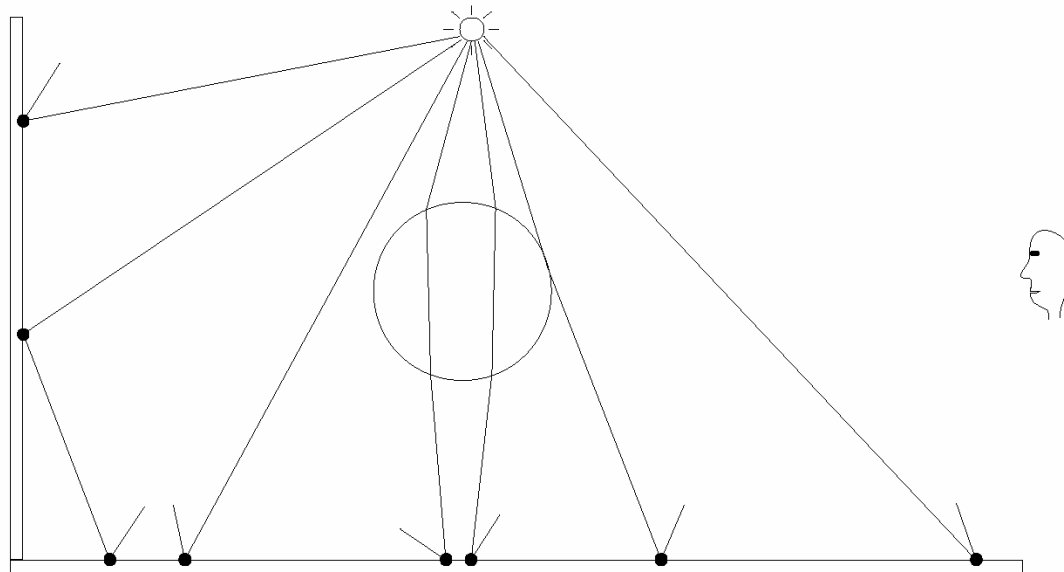


# Agenda

- Brief: What is photon mapping?
- How can the photon map be divided up into several photon maps?
- Advantages and disadvantages of using several photon maps.
- The future (our current ongoing project): How can this be used for real-time global illumination?

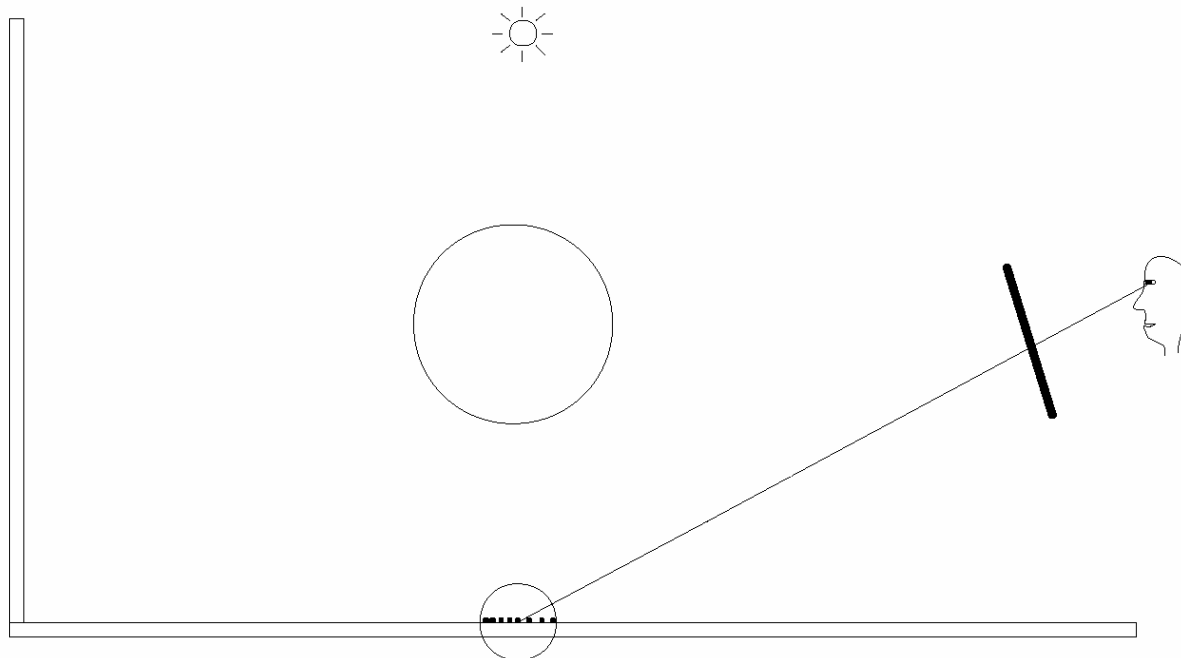
# What is photon mapping?

- A two step process:
- First the photons are distributed



# What is photon mapping?

- Then the scene is rendered, and the density is found.

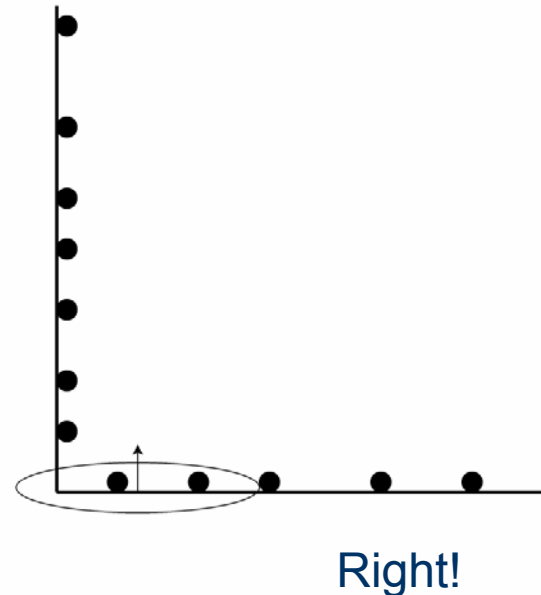
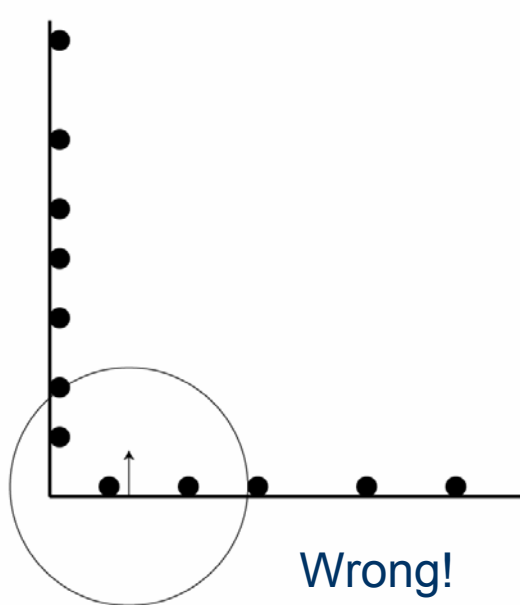


# What is the photon map?

- Answer: it is the data structure that all the photons are stored in.
- Usually three photon maps are used
  - One for caustics
  - One for indirect illumination
  - One for volume caustics

# The problem in the corners

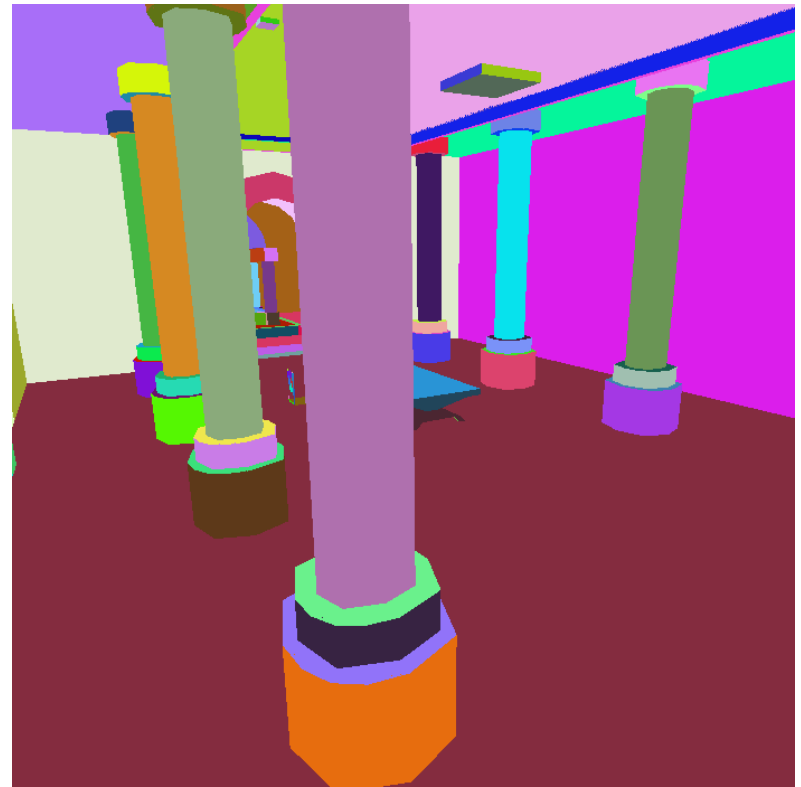
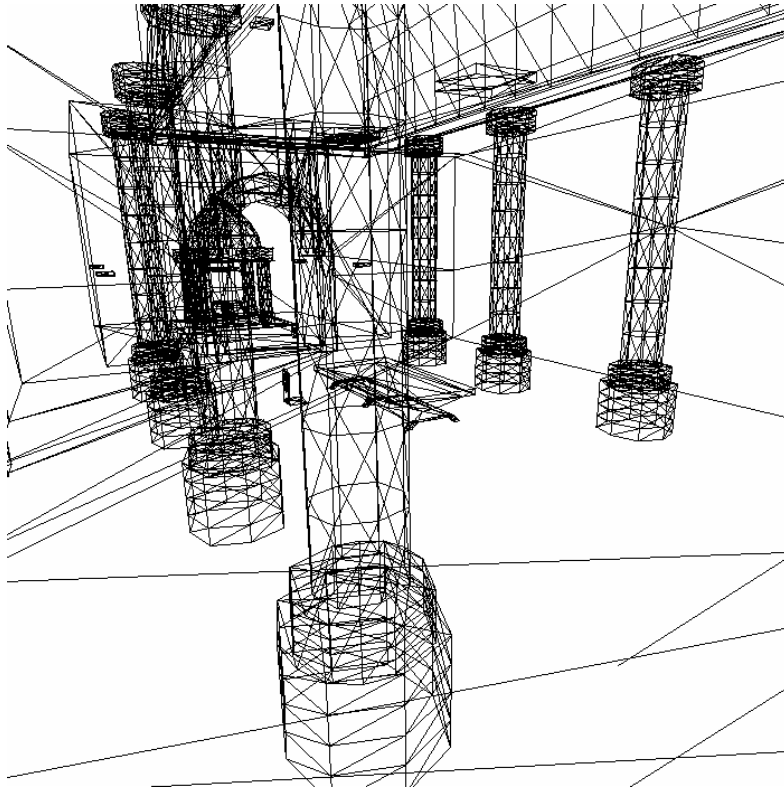
- In the corners only photons that are located on surfaces with the same normal as we hit should be considered



# Howto: Multiple photon maps

- Lets divide the photon map into several photon maps!
- if the angle between two adjacent polygons is larger than a certain degree
  - The polygons should be in different photon maps
- Else
  - The polygons should be in the same photon map

# Examples – several photon maps





# But is it a good idea?

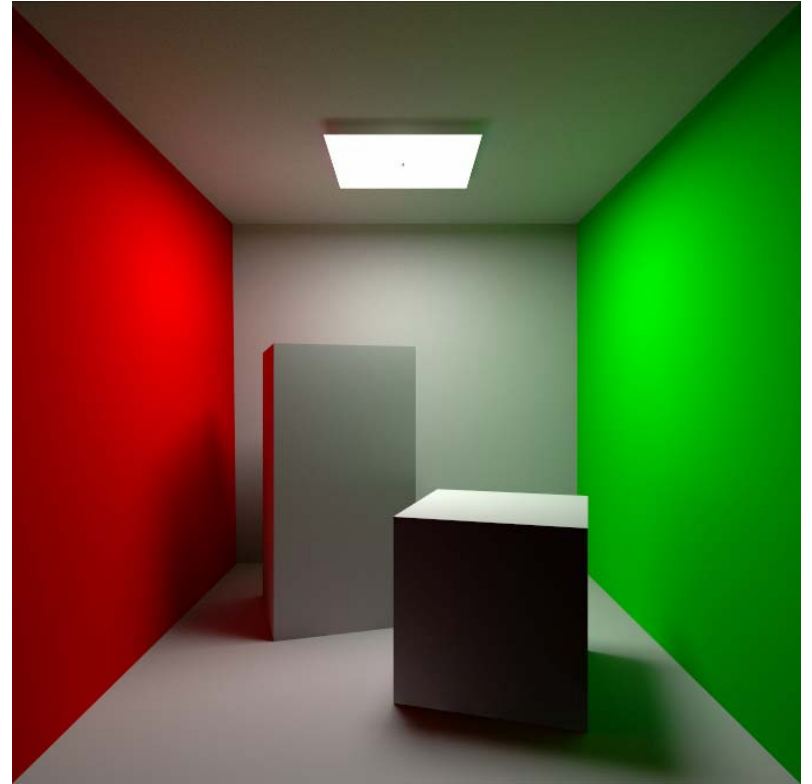
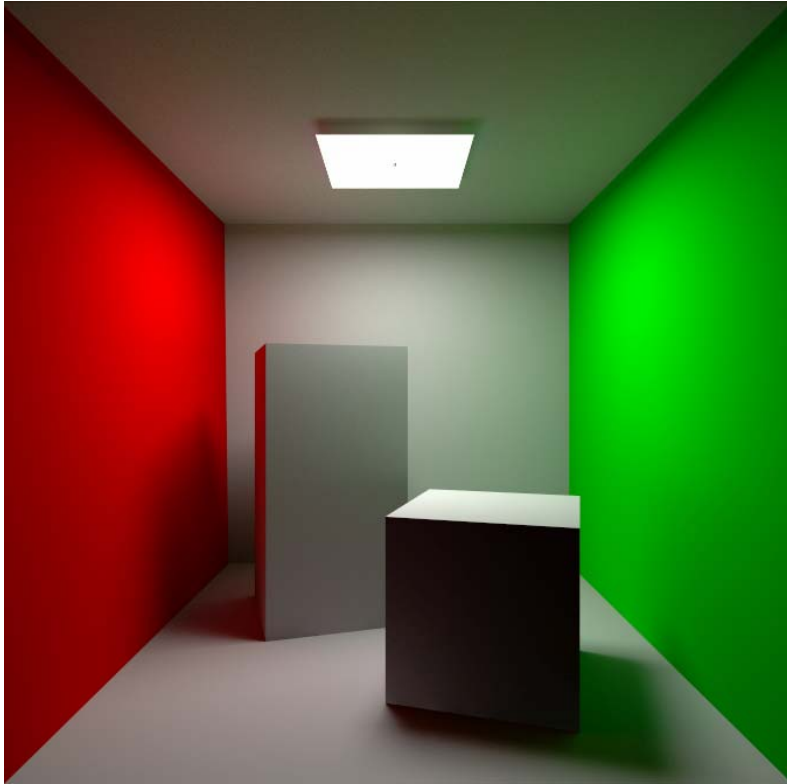
- Advantages

- Faster illumination calculation
- Faster pre-optimization of the photon maps
- No leaking problems in corners
- It may be possible to update a limited number of photon maps when creating animations.

- Disadvantages

- Connectivity has to be calculated
- Does not apply to all scenes

# Some results



# Future work

- Updating every thing in global illumination is very slow.
- Therefore only updating selected photon maps can come in handy!
- This is a (small) piece in our current research with real-time global illumination