An Occlusion Probability Model for Improving the Rendering Quality of Views

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Problem
Occlusion quantification for image-based rendering (IBR)

- 3D spatial structure of some features may be missing
- to capture some incorrect samples caused by occlusion discontinuities.

Related Work
Learning method:
- 1 is full visibility and to 0 when the occluders are blocking light transport. (Fredo Durand, et al.)
- A progressive convolutional neural network training paradigm to enforce the attention shift by the trainable attention model. (Juefei-Xu et al.)
Our goal:
- Design a method for improving the capturing information and the rendering quality of views with occlusion for the IBR.

Proposed Methods
An occlusion probability (OCP) model.

\[ P(x) = o(\kappa - x)e^{-(x-a)^2/2} \]

\[ P(\theta) = o(\kappa - \theta)e^{-(\theta-a)^2/2} \]

Parameterization
- The visibility function can be rewritten as
  \[ \rho(h | x) = \sum_{o(x' \in \cdot)} \exp \left( \sum_{i=1}^{n} \exp \left( \frac{|x-x'|}{2} \right) \right) \]
- The visible layer can be represented based on restricted boltzmann machine as
  \[ \rho(S \cdot X, h' \cdot b') = \prod_{i=1}^{n} p(x' | h') \prod_{i=1}^{n} p(h' | b') \]

Results
Validation of the spectrums.

Comparison results
- The ghosting occurs because the scene complexity such as the leaflage and irregular shape which are challenging constructed accurately. However, when using the proposed occlusion model, the ghosting and aliasing in the rendered views will decreases.

Conclusion
- A novel OCP model to improve the rendering quality of views with occlusion.
- A probability density model is applied to obtain the scores of visibility are modeled as hidden variables.
- Based on the occlusion probability, capturing/reconstruction techniques to visualize/manipulate can be improved.