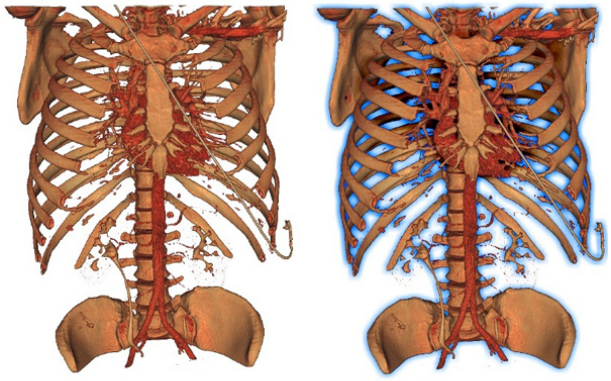
ViRVIG
Visualització, Realitat Virtual i Interacció Gràfica

www.virvig.eu
C. Llorens i Artigas 4-6
Edifici U, 1er pis
E- 08028- Barcelona

# Real-time Ambient Occlusion and Halos with Summed Area Tables

Diaz, Jose; Vazquez, Pere-Pau; Navazo, Isabel; Duguet, Florent



Volume models often show high depth complexity. This poses difficulties to the observer in judging the spatial relationships accurately. Illustrators usually use certain techniques such as improving the shading through shadows, halos, or edge darkening in order to enhance depth perception of certain structures. Both effects are difficult to generate in real-time for volumetric models. Either they may have an important impact in rendering time, or they require precomputation that prevents changing the transfer function interactively, as it determines the occlusions. In this paper we present two methods for the fast generation of ambient occlusion on volumetric models. The first is a screen-space approach that does not require any precomputed data structure. The second is a view independent method that stores volumetric information in the form of a Summed Area Table of the density values, and thus, allows the interactive change of transfer functions on demand, although at the expense of memory space. Despite the fact that similar quality results are obtained with both approaches, the 3D version is more suitable for objects with discontinuous structures such as a vessels tree or the intestines, and it yields better framerates. The screen-space version is more suitable in limited GPU memory environments because it does not need extra 3D texture storage. As an extra result, our screen-space technique also allows for the computation of view dependent, interactively configurable halos using the same data structure. We have also implemented both methods using CUDA and have analyzed their efficiency.

http://dx.doi.org/10.1016/j.cag.2010.03.005