

3D Line Textures and the Visualization of Confidence in Architecture

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Abstract

This work introduces a technique for interactive walkthroughs of non-photorealistically rendered (NPR) scenes using 3D line primitives to define architectural features of the model, as well as indicate textural qualities. Line primitives are not typically used in this manner in favor of texture mapping techniques which can encapsulate a great deal of information in a single texture map, and take advantage of GPU optimizations for accelerated rendering. However, texture mapped images may not maintain the visual quality or aesthetic appeal that is possible when using 3D lines to simulate NPR scenes such as hand-drawn illustrations or architectural renderings. In addition, line textures can be modified interactively, for instance changing the sketchy quality of the lines, and can be exported as vectors to allow the automatic generation of illustrations and further modification in vector-based graphics programs. The technique introduced here extracts feature edges from a model, and using these edges, generates a reduced set of line textures which indicate material properties while maintaining interactive frame rates. A clipping algorithm is presented to enable 3D lines to reside only in the interior of the 3D model without exposing the underlying triangulated mesh. The resulting system produces interactive illustrations with high visual quality that are free from animation artifacts.