

Size Equivalent Cluster Trees - Rendering CAD Models in Industrial Scenes

Abstract

Despite improvements of modern graphics cards three dimensional representation of large scene is a challenging field of activity. Examples of such scenes are industrial complexes, which are composed of a multitude of CAD models.

Size Equivalent Cluster Trees (SEC-Trees) present a possibility of overcoming these challenges. SEC-Trees are created by organizing triangles of an object in groups of triangles with similar area first, then clusters within these groups are identified. The clusters are handled as if they were only triangles and are inserted into the group corresponding to their size. The resulting hierarchy defines the SEC-Tree.

For each 3d model such a tree is generated within a preprocessing and rendered at runtime. Only a constant number of triangles in the scene is chosen for rendering at runtime, enabling navigation through large scenes. Within an object triangles are selected and rendered by hierarchical traversing the SEC-Tree and weighting its nodes.

Within the dissertation the construction of SEC-Trees is specified and analyzed, followed by a characterizing of the rendering. Finally, results gained from prototypical implementation are presented.