Data Representation with Relational Document Graphs for 3D Visualization

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A method for the modeling and visualization of complex systems of objects was developed. The method developed implements a custom document object model to represent arbitrary data structures as discrete objects for efficient rendering in a scene graph. This document object model is organized as a graph of objects which contain attributes used to describe the presentation of the object as a three-dimensional entity. Objects may contain relationships to other objects, which are defined by the user. An object's attributes and relationships may be bound to an event-driven function which represents and manages the relationship between the object’s attributes and a data source. Binding functions use a specialized selector grammar to allow for selecting a certain range of attributes and relations to map to a data source. An object's properties, such as size, shader, or geometry, are modified when a bound variable with an equally or more specific selector is modified, triggering the binding function. The system allows users to express complex structures as easily understood rules, which allow for rapid prototyping of complex and emergent behavior in applications with a high degree of interactivity, such as graphical visualizations or immersive environments.

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