Dynamic Focus+Context for Volume Rendering

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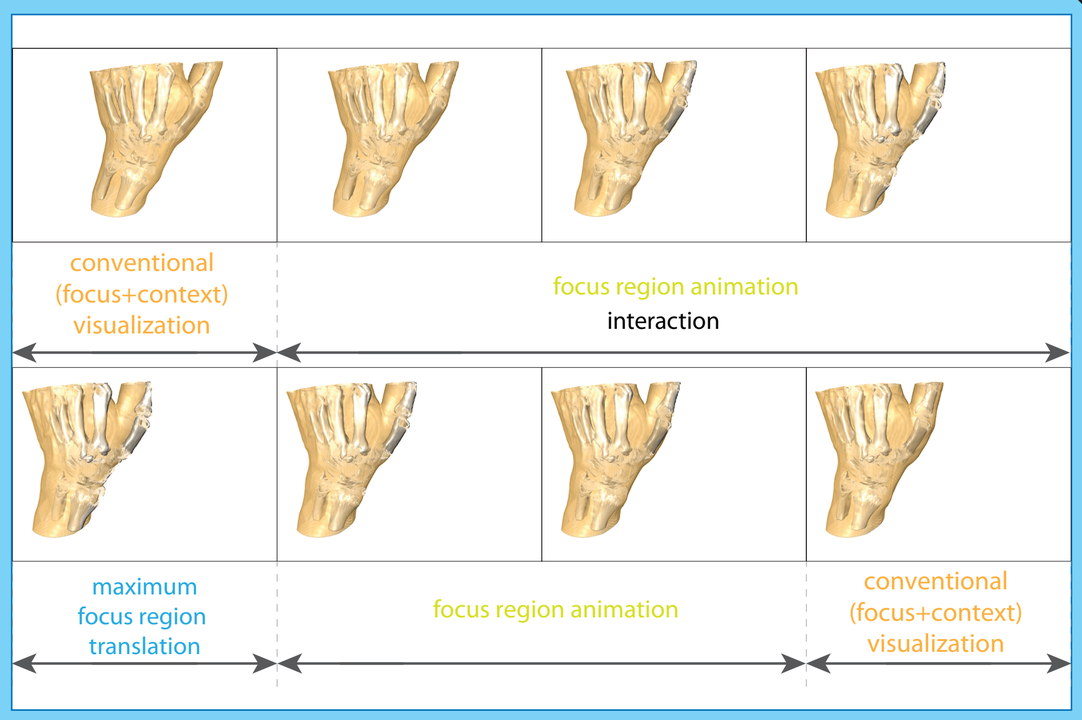
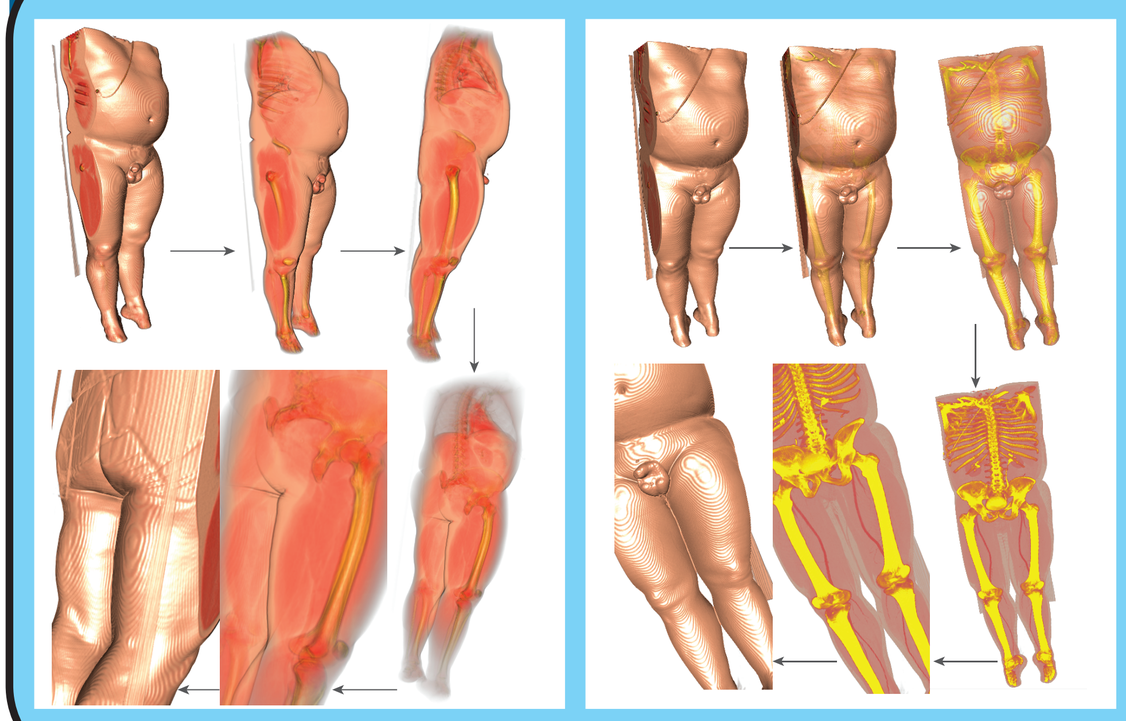
VMV 2010

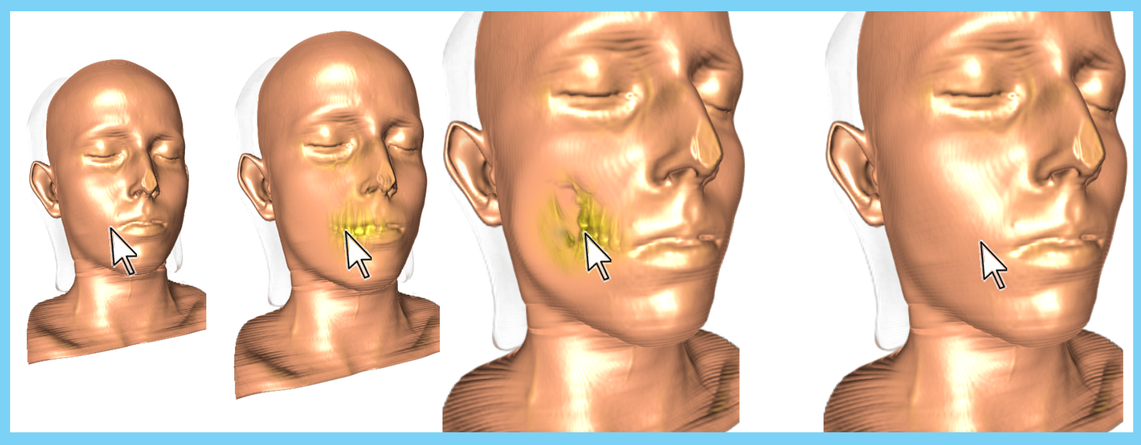
Panning Tool



Rotation Tool



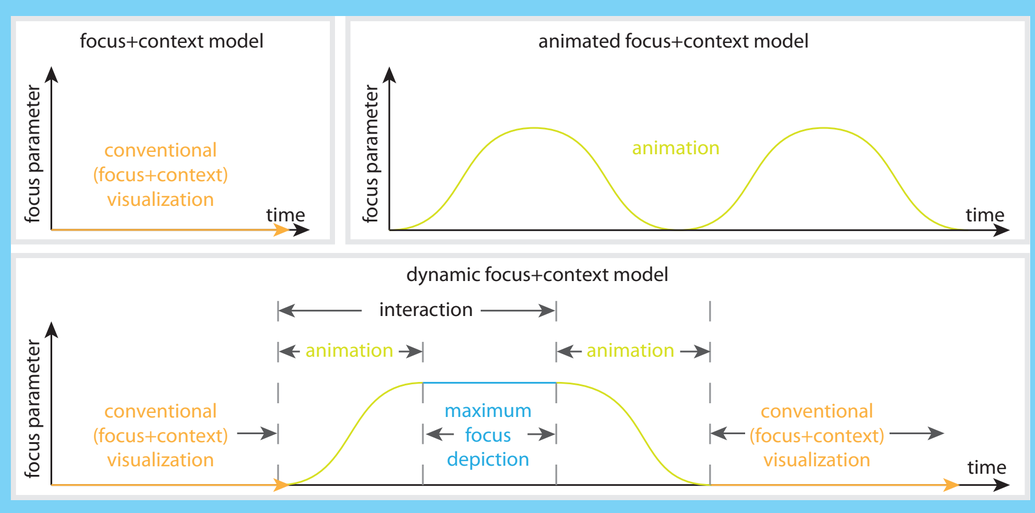
Zooming Tool



Abstract

Interactive visualization is widely used in many applications for efficient representation of complex data. Many techniques make use of the focus+context approach in a static manner. These techniques do not fully make use of the interaction semantics. In this paper we present a dynamic focus+context approach that highlights salient features during user interaction. We explore rotation, panning, and zooming interaction semantics and propose several methods of changing visual representations, based on a suggested engagement-estimation method. We use DVR-MIP interpolation and a radial opacity-change approach, exploring rotation, panning, and zooming semantics. Our approach adds short animations during user interaction that help to explore the data efficiently and aid the user in the detection of unknown features.

Focus+Context Models



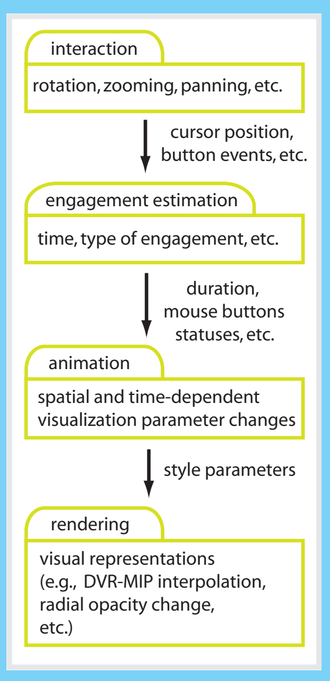
Focus+context methods are widely used in visualization systems. Although they are very well suited for many situations, the full human visual bandwidth could be exploited even further. Many approaches address this issue using animation. Animation is very useful to highlight the focus of visualization and also to visualize data quantities such as uncertainty. However, an excessively animated scene may distract the user's attention and lead to an overall lower effectiveness of the visualization. This observation leads us to the design of our novel dynamic focus+context technique that carefully uses animation only during and shortly after interaction. Our assumption is that the user needs guidance most during user interaction.

The traditional focus+context model is shown at the top, and the proposed model is shown at the bottom. Note, that unlike previous models, our model is highly dependent on user interaction.

Framework

The framework consists of 4 modules: interaction, engagement estimation, animation, and rendering:

- The interaction module encapsulates the typical user interaction activities, such as rotation, panning and zooming
- The engagement estimation module processes the interaction information, evaluating the type of engagement and its parameters
- The animation module changes the style of each voxel over time, by defining style parameters. The output of this module is the style function, defined for each voxel of the scene, visible to the user.
- The rendering module implements the visual representations and determines the final appearance of the rendered data. It uses style parameters, obtained from the previous stage, as input to the volume rendering techniques.



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