Rendering salient regions and interaction maps using GPU

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GPGPU programming can be used to effectively parallelize tasks such as isosurface computation, interaction map generation and saliency based rendering, involved in visualizing large volumes of simulation results. As different droplets are sampling the interaction space independently, we devise a parallel algorithm which is implemented on a GPGPU to efficiently build up the probability model. Most event detection and region of interest algorithms need to analyze the entire data (whole volume for all time steps) before they decide the relative importance of a region at a given time. However, we calculate saliency based on local volumetric features, it can be calculated in a single pass for every frame. The rendering parameters in a direct volume rendering framework are modulated according to the saliency to highlight regions which are informative to the user. We also show that isosurfaces of vorticity can be separated out based on connectivity to provide a reference to the study of interaction. Effect of very high vorticity structures can be studied in isolation as they are sufficiently well-separated in space.