

An Effectiveness Verification Method for Visualizing a Disaster Simulation

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SUMMARY

On the basis of our advanced super-computing environment, multi-scale and multi-physics simulation technologies have been being developed for modeling complex physical phenomena such as tsunami, diffusion of radioactive contaminations and melt-through caused by tremendous earthquakes. These HPC technologies are expected to foresee the disaster and to support the restoration from the disaster.

Since the disaster will have a huge impact on people's everyday's life, the simulation result should be what inspires people for the guideline of their next step. The simulation results are conveyed to people through the visualization. As well as the simulation technologies, the visualization technologies are important for the inspiration. An effective visualization facilitates people to deepen their thinking and start their mutual conversation, which will become a key to their next step.

Although many visualization technologies have been proposed, these have not been developed with respect to the maximization of their effectiveness. We often employ a colormap which transforms a scalar value to some color values. Usually, we use a rainbow colormap which maps a high value and a low value to red and blue, respectively. To minimize the information lost caused by the colormapping, another colormap might be optimal.

In the brain science field, there are interesting outcomes proposed for considering the visualization technologies with respect to their effectiveness. Some cognitive scientists have investigated the Aha! moment that solves a problem, reinterprets a situation, explains a joke, or resolves an ambiguous percept by using electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). They showed the topographic distribution of this gamma-band activity for the insight solutions minus the activity for the noninsight solutions in a human brain by using EEG and fMRI.

In our research, we will develop a methodology in which the visualization effectiveness can be maximized so that the topographic distribution becomes similar to that in the Aha! moment. Based on the methodology, we will carry out experiments in which we measure a percentage of correct answers by using a test dataset that contains some special information.