Visual Analytics for Exploring Ensemble Fields

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Abstract:

Each member of an ensemble simulation shows a possible occurrence of one or several physical fields, and domain experts are concerned with analyzing the uncertainty that is represented by such simulations. Due to the sheer volume of ensemble fields, their inherent spatial and temporal aspects, as well as the complex spatio-temporal interrelations between relevant features in these fields, classical data mining and statistical analysis techniques become increasingly limited. While simple analysis tasks, like finding commonalities or differences at fixed locations in space and time, can be realized in an automated way, already in absence of temporal variations a meaningful and intuitive depiction of the resulting 3D fields is challenging. When temporal variations, distributions, directional quantities, and spatio-temporal interdependencies between ensemble members have to be analyzed, the limitations of available techniques become even more severe and new approaches are required. In my presentation I will shed light on some current and future challenges in (meteorological) ensemble visualization, I will discuss ensemble visualization techniques that have been develop at the Chair for Computer Graphics and Visualization at TUM, and I will share ideas for future research in this field.