



Contour Boxplots: A Method for Characterizing Uncertainty in Feature Sets from Simulation Ensembles

Ross Whitaker (1), Mahsa Mirzargar (2), and Robert Kirby (3)

(1) Scientific Computing and Imaging Institute and School of Computing, University of Utah, United States (whitaker@sci.utah.edu), (2) Scientific Computing and Imaging Institute, University of Utah, United States (mirzargar@sci.utah.edu), (3) Scientific Computing and Imaging Institute and School of Computing, University of Utah, United States (kirby@sci.utah.edu)

Researchers, analysts and decision makers are not only interested in understanding their data but also interested in understanding the uncertainty present in the data. With an increase in the complexity and dimensionality of data, visualization has become an integral and essential part of data analysis, while uncertainty visualization techniques are specifically designed to facilitate the communication of uncertain information. Among various uncertainty visualization techniques, ensemble visualization is of great interest in application as often times, modeling is not able to capture the through behavior of the phenomenon under study. Hence, ensembles are used to convey the uncertainty of the model output. Deriving robust statistical information and visualizing the variability present in an ensemble is a challenging task, especially if the quantities of interest are features of the data such as isocontours. Contour boxplot, as a generalization of conventional univariate boxplot, was proposed as an ensemble visualization scheme to study the variability between ensemble members of isocontours while preserving the main features shared among the members. Contour boxplot provides descriptive information about the ensemble based on order statistics of the members such as, most representative ensemble member (median) and potential outliers. The non-parametric nature and robustness of the order statistics makes contour boxplot an advantageous approach to present and study uncertainty among ensemble of contours in various applications ranging from weather forecasting to geoscience.