Keynote

Visual Analytics as a Cognitive Science

Brian Fisher

Simon Fraser University School of Interactive Arts and Technology and Program in Cognitive Science

Director, Social Cognition and Interactive Expertise in Natural and Computational Environments (SCIENCElab)

Abstract

This talk explores the larger implications of visual analytics-- “the science of analytical reasoning facilitated by interactive visual interfaces”-- for cognitive science and informatics. I will argue that the methods that will advance this new science go beyond those of natural science and engineering, and will require researchers to create a new translational cognitive science of analytic systems. We will begin by building field study methods that characterize human and computational cognitive capabilities as they are used for decision-making in a range of situations. Because findings from field methods do not generalize well, we must then investigate these proposed capabilities in the laboratory. Finally we must build mathematical and computational theories that predict the impact of changes in technology on cognitive processes in technology-rich environments. These methods will only suffice until processing capacity reduces the lag between an analyst's query and a graphical response to a certain level. When the response is generated at the same pace as the sequence of cognitive operations that the analyst performs, human and computational processes become "close coupled". At this point the distinction between processes originating from the mind of the analyst (i.e. a mental representation) versus the computer (i.e. a visualization) become impossible to determine, and the subsystems we will study will seamlessly incorporate natural and artificial processes.

Biographical Note

Brian Fisher is Associate Professor of Interactive Arts and Technology and Cognitive Science at Simon Fraser University and Associate Director of the Media and Graphics Interdisciplinary Centre (MAGIC) at the University of British Columbia. He is also a member of the SFU Centre for Interdisciplinary Research in the Mathematical and Computational Sciences, and the UBC Brain Research Centre and Institute for Computing, Intelligent and Cognitive Systems. His research focuses on the cognitive science of human interaction with visual information systems, with the goal of developing new theories and methodologies for development and evaluation of technology to support human understanding, decision-making, and coordination of operations. This work is supported by the Natural Science and Engineering Research Council of Canada for applications in disaster preparedness and response with matching funding from the US Department of Homeland Security Command, Control and Interoperability Center of Excellence, and by the Boeing Company on understanding aircraft safety, reliability, and maintainability data with matching funding from the Mathematics of Information Technology and Complex Systems Network of Centres of Excellence (Canada).