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Toward a holistic framework for human-information interaction

Abstract: This poster presents four frameworks that characterize different facets of human-information interaction and examines how they may be integrated in a holistic manner. The resulting framework can inform the analysis, evaluation, and design of all types of interactive tools that support and enable a wide range of information-based cognitive activities.

Résumé: Cette affiche présente quatre cadres caractérisant différentes facettes de l'interaction humain–information et examine comment elles peuvent être intégrées de manière holistique. Le cadre résultant permet d'information l'analyse, l'évaluation et la conception de tout type d'outils interactif appuyant et ouvrant la voie à une vaste gamme d'activités informationnelles cognitives.

In recent years many researchers have identified and emphasized the need for a deeper and more comprehensive understanding of how we use, think with, and interact with information (e.g., Fast and Sedig, 2005; Albers, 2008; Liang, 2009; Blandford and Attfield, 2010; Marchionini, 2008; Jones et al., 2006). One of the essential features of conducting research to this end is a systematic investigation of the cognitive issues involved in the performance of high level information-based activities (Albers, 2008). Such activities include sense making, problem solving, decision making, analyzing, forecasting, learning, and planning. In recent years, interactive tools have become deeply embedded in the performance of many of these activities. Examples include social network visualization tools, knowledge mapping tools, personal information management tools, and information visualization tools. A common feature of all such tools is their visually-perceptible interface—the place where users meet and interact with information to perform high-level activities (e.g., decision making, analyzing) and tasks (e.g., searching, retrieving, locating). If designed properly, such tools can extend and enhance our interaction with information by providing better support for the performance of information-based cognitive activities (Sedig, 2009).

The effective design and evaluation of interactive tools that support and enable human-information interaction (HII) requires a deep and comprehensive understanding of how different facets of interaction influence cognitive activities. This poster will examine four frameworks that characterize different facets of HII, and will then discuss how they may be integrated into a holistic framework. The four frameworks are briefly described below.

Information representation patterns. When users interact with information they do so through representational forms at the visually-perceptible interface of a tool. The form

with which information is represented has been shown to have a significant impact on the performance of cognitive activities. As designers and evaluators, it is useful to have an understanding of the different ways in which information can be organized in representational forms and how they affect a user's interaction with information. This framework identifies and characterizes high-level representation patterns and discusses how each pattern influences the performance of cognitive activities.

Dimensions of information representations. All representations have certain dimensions, where a dimension refers to a feature, property, or distinctive quality. The settings of these dimensions have been shown to have significant effects on the performance of cognitive activities. In addition, the ideal settings of these dimensions are context, user, and task-dependent. Therefore, giving users the ability to adjust these settings through interaction can strengthen the quality of interaction with information and provide better support for performing cognitive activities. Being aware of these dimensions and how they influence the way users think and work with information can be beneficial for designers and evaluators. This framework identifies and characterizes a number of dimensions and discusses how adjusting their settings through interaction can increase support for cognitive activities.

Interaction patterns. This component deals with HII at the level of individual interactions performed at the interface of a tool. Users perform interactions to distribute the load of information-processing and to extend and enhance mental functions. Interactions play an important role in information-based cognitive activities—they allow users to bring new information into view, to alter information, to remove information, to interject new information, to view the displayed information from different perspectives, and to reorganize the displayed information. This framework identifies and characterizes a number of fundamental interaction patterns and discusses their utility in terms of supporting cognitive activities.

Structural elements of interactions. When users interact with a tool they engage in a dialogue with information. This dialogue involves users performing actions and receiving responses to those actions. The manner in which actions and reactions are operationalized has a significant effect on how well cognitive activities are performed. This framework identifies and characterizes a number of structural elements dealing with these two components of interaction. Such a framework can help with design and evaluation of lower-level aspects of HII.

Each of these frameworks act as a support structure for thinking systematically about a particular aspect of HII. Their integration into a larger framework can facilitate thinking in a more comprehensive and holistic manner and can provide a common vocabulary with which HII may be discussed. Such a framework can also inform the analysis, evaluation, and design of interactive tools that support and enable a wide range of information-based cognitive activities.

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