SNIF-ACT:
A Cognitive Model of User Navigation on the World Wide Web

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We will present a computational cognitive model that simulates how people seek information on the Web (Fu & Pirolli, 2007). This model is called SNIF-ACT, which stands for *Scent-based Navigation and Information Foraging* in the ACT architecture. SNIF-ACT provides an account of how people use information scent cues, such as the text associated with Web links, in order to make navigation decisions such as judging where to go next on the Web, or when to give up on a particular path of knowledge search. SNIF-ACT is shaped by rational analyses of the Web developed by combining the Bayesian satisficing model (Fu & Gray, 2006; Fu, 2007) with the information foraging theory (Pirolli & Card, 1999). We will describe the current status of the SNIF-ACT model and the results from testing the model against two data sets from real-world human subjects. At this point, our goal is to validate the model's predictions on unfamiliar information-seeking tasks for general users. Our model was successful in predicting users' behavior in these tasks, especially in identifying the "attractor" pages that most users visited.

We will focus on the newest development of the model called SNIF-ACT 2.0 here. In this version, we included an adaptive link selection mechanism that sequentially evaluates links on a Web page according to their position. The mechanism was derived based on a rational analysis of link selection on a Web page and the process of satisficing in action selection (Simon, 1956). The mechanism allowed the model to dynamically update the evaluation of actions (e.g., to follow a link or leave a Web site) based on sequential assessments of link texts on a Web page. This dynamic assessment allows online adjustment of the aspiration levels of different actions in the satisficing process based on the information scent values of links as well as implicit feedback (or reinforcement) received during each action cycle (Fu & Anderson, 2006), such that the action selection process is directly influenced by the content of the Web page. For example, the model's decision on when to click on a link or leave a page will be sensitive to experiences with previously visited links and pages. SNIF-ACT 2.0 was validated on a data set obtained from 74 subjects. Monte Carlo simulations of the model showed that SNIF-ACT 2.0 provided better fits to human data than SNIF-ACT 1.0 and a Position model that used position of links on a Web page to decide which link to select. We conclude that the combination of the IFT and the BSM provides a good description of user-Web interaction. Practical implications of the model will be discussed.

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