

The Quality of Prior Information Structure in Business Planning

- An Experiment in Environmental Scanning -

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Abstract. Increasing attention has been devoted in recent years to the firm's ability to adapt its marketing strategies to a rapidly changing environment. Given that the abundance of news, reports, and announcements found in new electronic environments such as the WWW hampers an extensive manual search, computer-based systems have become important supportive tools for business planning purposes. Several studies investigate the impact of managerial traits on this question, however the potential influence of an inadequate information structure in automatic information-seeking tools is rarely addressed.

In this paper, we examine the effect of the quality of the information structure in automated information-seeking tasks. We use a prototypic system that aims to detect and to evaluate relevant information about financial markets, and systematically contaminate the information structure by index terms referring to an adjacent but different task. Empirical evidence from an experimental evaluation of documents from the Reuters text collection substantiates the relevance of the prior information structure to the automated information search.

1 Introduction

Environmental scanning (ES) refers to the processes of scanning the business environment in order to detect changes crucial to future business success. Walters et al. (2003) argue that ES is the inevitable first step in business planning. One major challenge in business planning stems from the rather unstructured and complex business environment, consisting of a wide range of areas that may affect the business' success (Xu et al. 2003). In addition to the demanding task of identifying relevant issues from the steady stream of information with which the decision maker is faced, he must also be capable of comprehending and interpreting the meaning of this information. Regerer and Palmer (1996) as well as more recently Rouse (2002) show that naturally this process is strongly based on prior knowledge and experience. The prior domain knowledge in information retrieval – or in other words the *information structure* – has a crucial impact on information-seeking processes in general, and particularly, on the identification of relevant information (Baeza-Yates and Ribeiro-Neto 1999). While several previous studies refer to the *quality*

and *efficiency* of algorithms (see e.g., Yang and Liu (1999) for a comparison of topic detection and tracking algorithms), which provide a rating or classification of documents, a systematic consideration of the impact of the a priori knowledge used in the context of information-seeking tasks has rarely been a matter of subject. This issue seems even more significant when considering that more than 75 % of organizations use information technology to aid their gathering, analyzing, and reporting efforts in ES (CIO-Insight 2003). This study aims to scrutinize the impact of the prior information structure

- on the choice of individual information sources,
- on the evaluation of information sources, and
- on the number of chosen information sources.

The selection process of our prototypic system for information selection is built upon information foraging theory (IFT), which is a promising approach in modeling human information search and selection processes in ES.

The remainder of this paper is structured as follows: First, we introduce a model for automated information selection on the WWW that roots in the *heuristics* of IFT. Subsequently, we outline an experiment for the analysis of the impact of information structure on information-seeking tasks through a performance test in the context of a typical ES task. The paper concludes with a summary of our empirical investigations and their implications.

2 The Model

2.1 Basic Principles of Information Foraging Theory

IFT is a cognitive driven approach that models information-seeking behavior of human individuals. Central to its thesis is the idea that the search for information is an expatriation of food foraging mechanisms. Pirolli and Card (1999) adapted the theory of optimal foraging, which seeks to explain the adaptations of organism structure and behavior to the environmental constraints of foraging for food. The theory is based on the hypothesis that, when possible, natural information systems evolve toward stable states that maximize the gain of valuable information per unit cost. IFT, like optimal foraging theory, is made up of three components (Stephens and Krebs 1986):

- (a) *Decision component*: How to find an optimal choice for the forager's problem?
- (b) *Currency component*: How are various choices to be evaluated?
- (c) *Constraint component*: What limits the decision forager's feasible choices, and what limits the pay-off (currency) that may be obtained?

Taking into account these components our model is based on the subsequent assumptions:

- (i) *Exclusivity of search and exploitation*: The forager can only do one action at a time. He must choose between searching for and consuming of sources.