

Analyzing Searching Behavior in Online Shopping Sites based on Product-Specificity of Query Words

Kei Wakabayashi *, Genkou Ou *, Tetsuji Satoh *

Abstract

As the internet continues to spread as a crucial element of social infrastructure, more and more people are shopping online. Online sites that formerly dealt with such specific products as books and clothing have expanded to mall-type shopping sites by incorporating various kinds of stores. This transition has made product searches by users more complicated and prolonged. In this paper, we propose a method that analyzes the transition patterns of the product-specificity of queries in a product-searching behavior. As a key concept in our proposed method, we adopt the notion of information content, which represents the amount of information contained in a query, to quantitatively define product-specificity. We conducted an experiment on an actual shopping log dataset to confirm the effectiveness of our proposed method. The result demonstrates that the proposed method extracts illuminating behavioral patterns such as “narrowing-down behavior” that keeps adding query words and “expanding behavior” that keeps removing query words to increase the search results.

Keywords: Searching Behavior, Online Shopping, Information Content, Log Analysis

1 Introduction

Due to the spread of online shopping sites, opportunities to purchase products from online sources continue to increase. If such online sites were actual stores, desired products could be narrowed down before being purchased based on consultation with a clerk. If a user’s desired product is not clear, people can window-shop at several stores to find items that satisfy their shopping desires. However, in online shopping, all purchasing behaviors must be performed through such network terminals as personal computers and smartphones. Users iterate between narrowing down product choices by keyword searches and checking products by browsing product lists on screens. Unlike experiences with informative, intelligent store clerks, unless an adequate keyword is given, the number of products in the search result may be too large or too small for browsing, inconveniencing the user [19]. Therefore, determining efficient, useful search keywords is a critical requirement in purchasing behavior in online shopping.

Search keywords include language of various product-specificity: words that refer to a specific product or brand, such as “iPhone8,” words that indicate a product category, such

* University of Tsukuba, Ibaraki, Japan

- [25] A. E. Schlosser, T. B. White, and S. M. Lloyd, “Converting Web Site Visitors into Buyers: How Web Site Investment Increases Consumer Trusting Beliefs and Online Purchase Intentions,” *Journal of Marketing*, vol. 70, no. 2, pp. 133–148, 2006.
- [26] P. Sondhi, M. Sharma, P. Kolari and C. Zhai, “A Taxonomy of Queries for E-commerce Search,” *Proceedings of the 41st International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 1245–1248, 2018.
- [27] D. Sontag, K. Collins-Thompson, P. N. Bennett, R. W. White, S. Dumais, and B. Billerbeck. “Probabilistic models for personalizing web search,” *Proceedings of the fifth ACM international conference on Web search and data mining*, pp. 433–442, 2012.
- [28] J. Teevan, S. T. Dumais, and D. J. Liebling. “To personalize or not to personalize: modeling queries with variation in user intent,” *Proceedings of the 31st annual international ACM SIGIR conference on Research and development in information retrieval*, pp. 163–170, 2008.
- [29] J. Teevan, S. T. Dumais and E. Horvitz, “Potential for Personalization,” *ACM Trans. Comput.-Hum. Interact.*, vol. 17, no. 1, pp. 4:1–4:31, 2010.
- [30] X. Yan, J. Guo, Y. Lan, and X. Cheng, “A biterm topic model for short texts,” *Proceedings of the 22nd international conference on World Wide Web*, pp. 1445–1456, 2013.
- [31] K. Zhai, Z. Kozareva, Y. Hu, Q. Li and W. Guo, “Query to Knowledge: Unsupervised Entity Extraction from Shopping Queries Using Adaptor Grammars,” *Proceedings of the 39th International ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 255–264, 2016.