

# MISQ Archivist

## Examining the Impact of Keyword Ambiguity on Search Advertising Performance: A Topic Model Approach

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### Abstract

In this paper, we explore how keyword ambiguity can affect search advertising performance. Consumers arrive at search engines with diverse interests, which are often unobserved and nontrivial to predict. The search interests of different consumers may vary even when they are searching using the same keyword. In our study, we propose an automatic way of examining keyword ambiguity based on probabilistic topic models from machine learning and computational linguistics. We examine the effect of keyword ambiguity on keyword performance using a hierarchical Bayesian approach that allows for topic-specific effects and nonlinear position effects, and jointly models click-through rate (CTR) and ad position (rank). We validate our study using a novel data set from a major search engine that contains information on consumer click activities for 2,625 distinct keywords across multiple product categories from 10,000 impressions. We find that consumer click behavior varies significantly across keywords, and such variation can be partially explained by keyword ambiguity. Specifically, higher keyword ambiguity is associated with higher CTR on top-positioned ads, but also a faster decay in CTR with screen position. Therefore, the overall effect of keyword ambiguity on CTR varies across positions. Our study provides implications for advertisers to improve the prediction of keyword performance by taking into account keyword ambiguity and other semantic characteristics of keywords. It can also help search engines design keyword planning tools to aid advertisers when choosing potential keywords.

**Keywords:** Sponsored search advertising, topic models, keyword ambiguity, machine learning, hierarchical Bayesian model