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Discovering Efficient Keywords – An Exploratory Study on Comparing the Use of ChatGPT and Other Third-party Tools

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Abstract
ChatGPT has become a popular keyword discovery tool since it was introduced to the market in late 2022. This study is to compare the effectiveness of this new keyword discovery tool and Spyfu, a widely used third-party tool. The comparison aims to examine which tool is more effective in discovering efficient keywords. The keyword efficiency scores are defined and calculated by using the Data Envelopment Analysis (DEA) based on historical data from a specific period of time. Both ChatGPT and a third-party tool (Spyfu) provide two lists of top keywords with Broad Match and Modified Broad Match. It is found that about forty percent of Spyfu recommended keywords turn out to be efficient, while less than twenty percent of the keywords generated by ChatGPT are efficient. The results of the study indicate that ChatGPT is not as effective in discovering efficient keywords compared to Spyfu. However, ChatGPT is found to be highly effective in predicting search trends and identifying long-tail keywords and query questions that are specific and targeted to the users' needs. A combination of both tools may provide the best results for keyword discovery and strategy fine-tuning.

Keywords: Data Envelopment Analysis (DEA), Keyword Efficiency, ChatGPT, Search Engine Marketing.

JEL classification: M30, M31, M37.

Introduction

One key aspect of successful search engine marketing is the selection of relevant and effective keywords. In recent years, tools such as Spyfu and Google Keyword Planner have been widely used to assist marketers in discovering keywords for their campaigns (Hande and Muley, 2022; Shahzad et al., 2020).

Since its debut in late 2022, ChatGPT, a language model developed by OpenAI, has been gaining popularity in the field of Search Engine Marketing for its ability to generate high-quality and relevant keywords (Cutler, 2023). With the increasing importance of search engine optimization (SEO) and pay-per-click (PPC) advertising, companies are constantly looking for ways to improve their keyword discovery and selection process. Spyfu, a popular keyword research tool, has long been used by marketers for this purpose (Erdmann et al., 2022). However, with the emergence of ChatGPT, there is a need to compare the effectiveness of these two approaches to keyword discovery (Nagpal and Petersen, 2021). This exploratory research aims to compare the performance of Spyfu and ChatGPT in generating relevant and effective keywords for Search Engine Marketing. By doing so, this research will provide initial insights into the strengths and weaknesses of each approach and help marketers make informed decisions about which tool to use for their keyword research needs.

SpyFu – keywords discovery

SpyFu provides insights and analytics on keyword research, which allows users to discover profitable keywords for their own campaigns or analyze the keywords used by competitors (Hande and Muley, 2022).

According to www.spyfu.com, to select keywords, SpyFu uses a variety of data sources and algorithms to provide comprehensive insights on keyword performance, including search volume, cost-per-click, competition, and ranking difficulty. SpyFu also provides suggestions for related keywords and long-tail variations based on the user's search query.

Users can enter a domain or keyword to see a list of related keywords, their search volume, and other metrics such as the number of advertisers bidding on each keyword, the cost-per-click, and the estimated click-through rate. SpyFu also provides information on the historical performance of each keyword, allowing users to see trends over time.

ChatGPT – keywords discovery

ChatGPT can suggest a list of potential keywords related to a particular topic by using three general techniques that are commonly used for keyword discovery: brainstorming ideas and concepts, analyzing user search queries, and using Google autocomplete. Brainstorming can be done by analyzing the content of a website or conducting market research to determine what terms people are searching for. Analyzing the search queries used by users in search engines can provide insights into what keywords people are searching for in relation to a particular topic. Google Autocomplete is a feature that suggests search terms as users type in the search bar. This can provide ideas for related keywords that people are searching for.

Keyword efficiency

According to Jiang (2018), to increase revenue, retailers should maximize keyword efficiency, as Google's quality score mainly affects the cost environment. Hence, retailers with efficient keywords are more likely to succeed than those without. Their study found that keywords should be evaluated by considering multiple variables. The efficiency of search engine strategies depends on an advertiser's ability to maximize their outputs effectively, given the specified resources, and conclude that keyword efficiency is crucial for the profitability of these keywords.

Data Analysis - a case study of an online retailer

Building upon Jiang's research in 2018, this study utilizes Data Envelopment Analysis (DEA) to generate a comprehensive list of efficient keywords using data from an online retailer. DEA is a non-parametric technique that assesses the relative efficiency of decision-making units by considering multiple inputs and outputs (Charnes et al., 1978). Unlike traditional efficiency measures that rely on a single performance metric, DEA provides a more comprehensive evaluation by considering the entire range of inputs and outputs involved.

In the context of this study, DEA is employed to determine the optimal allocation of resources that contribute to the success and efficiency of sponsored search advertising. The concept of price efficiency is derived from Kamakura et al. (1988). In the context of keywords, efficiency is determined by comparing the price of a keyword with its quality or effectiveness. A keyword is considered inefficient if there are other keywords available that offer lower prices while delivering equivalent or higher quality.

Therefore, in this study, we adopt these definitions to assess the efficiency of keywords based on their pricing and quality factors (Jiang, 2018). By identifying efficient keywords in a particular product category of online retailing, we can evaluate the effectiveness of keyword discovery tools based on the percentages of the efficient keywords uncovered by those tools.

$$\underset{h_j,\, s_r^+,\, s_i^-}{(\text{Max})}\ Z_k + \xi\left(\sum_{r=1}^{g} s_r^+ + \sum_{i=1}^{m} s_i^-\right) \qquad (1)$$

Subject to:

$$p_{rk}z_k - \sum_{j=1}^{n} p_{rj}h_j + s_r^+ = 0 \quad (r = 1, 2,\ldots\ldots, g) \qquad (2)$$

$$\sum_{j=1}^{n} x_{ij}h_j + s_i^- = x_{ik} \qquad (i = 1, 2,\ldots\ldots, m) \qquad (3)$$

$$\sum_{j=1}^{n} h_j = 1 \qquad (4)$$

$$h_j, s_r^+, s_i^- \geq 0 \qquad (j = 1, 2,\ldots\ldots, n) \qquad (5)$$

Key variables and parameters are defined in Data Envelopment Analysis (DEA) as follows:

- n represents the number of keywords within each category.
- m denotes the number of inputs considered in the analysis.
- g signifies the number of outputs used to measure keyword characteristics.
- xij represents the level of the i-type input for the keyword j.
- prj represents the level of the r-type output (keyword characteristic) for keyword j.
- Zk represents the efficiency ratio for the keyword being analyzed.
- ξ is a small positive parameter.
- sr+ and si- are slack variables associated with output r and input i, respectively.
- hj represents the weight assigned to keyword j.

To solve these DEA models, a computer program is employed. Through this approach, a comprehensive keyword list with efficiency scores calculated for each keyword is generated for evaluation and comparison of Spyfu and ChatGPT keyword discovery tools.

Results and comparison

Out of 899 commonly used keywords analyzed, the DEA analysis generates a list of nearly 300 efficient keywords relating to Online Apparel Retailing in the product category of Cashmere Sweaters.

Table 1. Efficient Keywords – Comparison between Spyfu and ChatGPT

SpyFu (Efficient keywords of its top 20 selection)		ChatGPT (Efficient keywords of its top 20 selection)	
Efficient words	Google Quality Score (1-10)	Efficient words	Google Quality Score (1-10)
cashmere sweaters	8	cashmere sweaters for women	10
women cashmere cardigans	7	cashmere sweaters for men	8
cashmere mens sweaters	8	cashmere turtlenecks	5
mens v neck cashmere sweater	7	cashmere hoodies	5
cashmere polo neck	5		
cashmere sweaters womens	10		
womens cashmere sweater	8		
cashmere mens	7		

Among the top 20 keywords suggested by Spyfu in the keyword discovery process, 40% (8 keywords) are listed on the efficient keyword list through the DEA approach. Those keywords are cashmere sweaters, women cashmere cardigans, cashmere mens sweaters, mens v neck cashmere sweater, cashmere polo neck, cashmere sweaters womens, women cashmere sweater, and cashmere mens (see Table 1 above).

Among the top 20 keywords suggested by ChatGPT, 20% (4 keywords) are listed on the efficient keyword list. Those keywords are cashmere sweaters for men, cashmere sweaters for women, cashmere turtlenecks, and cashmere hoodies. In addition, among the top 20 modified match keywords from ChatGPT in keywords discovery, only 10% (2 keywords) are listed on the efficient keyword list. Those two keywords are +men's +cashmere +sweaters and +women's +cashmere +sweaters.

Efficient keywords suggested by Spyfu and ChatGPT include gender-specific keywords, catering to both women and men seeking cashmere sweaters. Spyfu keywords include more specific keywords related to various styles and types of cashmere sweaters, such as cardigans, v-neck, polo neck, and specific mentions of women's and men's styles.

ChatGPT keywords, on the other hand, focuses more on the general category of cashmere sweaters for women and men, without specifying particular styles. ChatGPT introduces additional styles like turtlenecks and hoodies, expanding the range of cashmere sweater options beyond the basic sweaters suggested by Spyfu. Spyfu includes some repeated keywords, whereas ChatGPT focuses on unique variations for women and men, with specific mentions of gender in the keywords.

In summary, Spyfu demonstrates twice as effective in discovering efficient keywords in comparison to ChatGPT. Also, efficient keywords uncovered by Spyfu and ChatGPT differ in terms of specificity, additional styles, and the level of gender specification. From Table 1, we can see there is not much difference between the selected efficient keywords on their Google quality scores. Both Spyfu and ChatGPT suggest a similar keyword "cashmere sweaters womens", which has a perfect quality score of 10. The totally different efficient keywords generated from Spyfu and ChatGPT turn out to be the ones having a low-quality score of 5s, for example, cashmere polo neck from Spyfu and cashmere hoodies from ChatGPT. It seems quality score can be used as an additional metric when marketers strive to generate consistent keyword lists from both Spyfu and ChatGPT tools.

Comparison of top 10 query questions

The two sets of questions from Spyfu and ChatGPT focus on different aspects of cashmere sweaters, but there are also some similarities (see Table 2). Both sets of questions include inquiries about how to care for cashmere sweaters, such as cleaning, washing, and storing. There is overlap in the concern for repairing and fixing issues with cashmere sweaters, such as unraveling, repairing holes, and dealing with moth holes. Both sets of questions express an interest in understanding the characteristics and quality of cashmere sweaters.

Spyfu questions are more practical and hands-on, focusing on actions to be taken with old cashmere sweaters, while ChatGPT questions are more informational, seeking knowledge about buying, caring for, and identifying high-quality cashmere sweaters.

Spyfu questions include specific actions like shrinking the sweater, repairing moth holes with images, and fixing holes, while ChatGPT questions explore topics like affordable purchasing options, best brands, and the difference between cashmere and wool. ChatGPT touches on the benefits of wearing cashmere and preventing pilling, which are not present in Spyfu.

Table 2. Question queries – Comparison between Spyfu and ChatGPT

SpyFu (top 10 selection)	Search volume (Monthly clicks)	ChatGPT (top 10 selection)	Search volume (Monthly clicks)
1. What to do with old cashmere sweaters	460 (270)	1. Where can I buy affordable cashmere sweaters?	(150, 150)
2. How to clean cashmere sweater at home	420 (360)	2. How do I care for my cashmere sweater?	(55, 40)
3. How to wash cashmere sweater	400 (400)	3. What are the best brands for cashmere sweaters?	(44, 30)
4. How to unravel a cashmere sweater	360 (250)	4. How do I wash my cashmere sweater?	(400, 400)
5. How to repair hole in cashmere sweater	360 (260)	5. What is the difference between cashmere and wool?	(40, 28)
6. How to shrink cashmere sweater	320 (260)	6. What are the benefits of wearing cashmere?	(<20)
7. How to repair moth holes in cashmere sweater	290 (180)	7. How can I prevent my cashmere sweater from pilling?	(40, 40)
8. How to store cashmere sweaters	270 (270)	8. How do I store my cashmere sweater?	(180, 180)
9. How to fix hole in cashmere sweater	260 (135)	9. What are the different types of cashmere sweaters?	(<20)
10. How to repair moth hole in cashmere sweaters images	230 220)	10. How can I tell if a cashmere sweater is high-quality?	(<20)

Spyfu questions revolve around practical actions and maintenance of cashmere sweaters, while ChatGPT discovers questions focusing on acquiring knowledge about purchasing, caring for, and understanding different aspects of cashmere sweaters.

Both sets of questions can be valuable for search engine marketing, but they cater to different aspects of customer needs and interests. Understanding the use of each set can help inform targeted marketing strategies.

Spyfu questions have higher search volume and estimated monthly clicks. This set is relevant for targeting customers who already own cashmere sweaters and are seeking solutions to specific issues or tasks related to their garments. Search engine marketing can capitalize on these queries by providing helpful and informative content, such as blog posts, tutorials, or videos, that address the various topics in this set. By optimizing keywords and content related to cleaning, repairing, unraveling, and storing cashmere sweaters, marketers can attract users seeking solutions and position themselves as experts in the field. Additionally, offering products like repair kits or storage solutions can complement the content and provide opportunities for sales.

The ChatGPT questions focus on acquiring knowledge and making informed decisions about cashmere sweaters. Most questions in this set do not have much search volume and clicks. However, this set targets customers who are researching before making a purchase or seeking to enhance their understanding of cashmere sweaters. Search engine marketing can leverage these queries by providing educational content, buying guides, brand comparisons, and quality assessments. By optimizing keywords and content related to affordable purchasing, care tips, brand recommendations, and differentiating cashmere from other materials, marketers can attract users in the early stages of the customer journey. Building credibility and

trust through informative content can influence purchase decisions and establish a brand as a reliable source of information. For a company planning to develop new demand and acquire new customers, query questions suggested by ChatGPT are great starting ideas for content creation and promotion strategies.

Conclusions

This exploratory research brings up a brand-new question on the effectiveness of keyword discovery of ChatGPT. A case study using data from a particular online retailer is used to take an initial look at the difference between Spyfu and ChatGPT on their keyword discovery capabilities. Through this study, we hope to provide marketers with a basic understanding of the strengths and weaknesses of these tools and enable them to make informed decisions when selecting a keyword discovery tool for their campaigns. Clearly, judging long-term viability on an overall evaluation of keyword discovery tools such as ChatGPT would need longitudinal studies and comprehensive data from different industries.

To effectively utilize query questions from ChatGPT for search engine marketing, marketers should conduct keyword research to identify the specific queries and search terms related to each question. By optimizing website content, meta tags, and landing pages for relevant keywords, marketers can increase visibility in search engine results pages and attract users actively seeking information or solutions. It is essential to understand the target audience and align the marketing strategies with their needs and intentions to maximize the impact of search engine marketing efforts. It is important to profile the efficiency and the quality scores for keywords provided by ChatGPT before implementing them in Search Engine Optimization and PPC campaigns. We conclude that ChatGPT is not as effective in discovering efficient keywords compared to Spyfu, a third-party keyword research tool. However, ChatGPT is found to be highly effective in providing query questions that are useful in targeting information seekers and new customer acquisition and demand generation.

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