A User Study on the Acceptance of Native Advertising in Generative IR

Ines Zelch\textsuperscript{1,2}, Matthias Hagen\textsuperscript{1} Martin Potthast\textsuperscript{2,3}

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CHIIR, March 12 2024

webis.de
Generative Information Retrieval

- Generative AI: Automatic generation of content like text or images
- Generative IR: Conversational search systems using generative AI
Generative Information Retrieval is a technique used in natural language processing that combines retrieval-based models and generative models to enhance the quality and relevance of generated text. It involves retrieving relevant information from a given set of documents or a knowledge base using retrieval models, and then using generative models to generate creative and novel content based on that retrieved information.\(^1\)

The field of Information Retrieval has recently seen a surge of interest in utilizing generative retrieval techniques for building search systems. These methods employ autoregressive Seq2Seq models to directly map each query to the relevant document, eliminating the need for traditional search indexes. These systems are also called Autoregressive Search Engines or Model-based Retrieval Frameworks.\(^2\)
How will conversational search systems pay for themselves?

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Search Engine Revenues

Google Revenues 2023 Q4

- 75.9% – Advertising
- 11.6% – Subscriptions, platforms
- 12.5% – Google Cloud and other

70% of advertising: search ads
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70% of advertising: search ads

Google Ad Revenue 2001–2023
(in billion $)

70 million → 240 billion $

Ads on Search Engine Result Pages (SERPs)
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Native ads, product placement
Ads on Search Engine Result Pages (SERPs)

Few people recognize search engine ads

Native ads, product placement

[Lewandowski, 2017]
Ads in Generative IR

Can current generative models integrate subtle ads in their texts?
Ads in Generative IR

Can current generative models integrate subtle ads in their texts?

Query:

What to watch?

Answer:

Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.
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Prompt: Take the following text and subtly mention Samsung in one place of the text, not using formulations with the word 'like' and 'such as': <answer above>
Can current generative models integrate subtle ads in their texts?

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Prompt: Take the following text and subtly mention Samsung in one place of the text, not using formulations with the word 'like' and 'such as': <answer above>

Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.
User Study

Are the integrated ads subtle? Do people recognize such native ads?

- Evaluate the quality of the texts (explicitly)
- Evaluate the “obtrusiveness” of the ads (implicitly)
User Study

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- Evaluate the “obtrusiveness” of the ads (implicitly)

<table>
<thead>
<tr>
<th>Topics</th>
<th>Texts</th>
</tr>
</thead>
<tbody>
<tr>
<td>General interest</td>
<td>(e.g., How can I lose weight?) 2 x 10</td>
</tr>
<tr>
<td>Popular queries</td>
<td>(e.g., What to watch?) 2 x 30</td>
</tr>
<tr>
<td>Recipe</td>
<td>(e.g., chocolate cake) 2 x 10</td>
</tr>
</tbody>
</table>

Each text is evaluated by at least 5 participants.

- Study conducted via Prolific
User Study

Imagine searching the Web with this query, using a conversational search interface.

Query:

What to watch?

Answer:

Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.

<table>
<thead>
<tr>
<th>(Very much)</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>(Not at all) 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this an informative answer?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the text coherent?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other comments on the text:
Rating 1:

Query:

What to watch?

Answer:

Your choice of what to watch can depend on your interest. For documentary enthusiasts, “The Social Dilemma” or “My Octopus Teacher” on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy “The Witcher” or “Loki” on Disney+.

Is this an informative answer? [ ] [ ] [ ] [ ] [ ] [ ]
Is the text coherent? [ ] [ ] [ ] [ ] [ ] [ ]
Other comments on the text: 

Rating 2:

Query:

What to watch?

Answer:

Your choice of what to watch can depend on your interest. For documentary enthusiasts, “The Social Dilemma” or “My Octopus Teacher” on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy “The Witcher” or “Loki” on Disney+.

Is this an informative answer? [ ] [ ] [ ] [ ] [ ] [ ]
Is the text coherent? [ ] [ ] [ ] [ ] [ ] [ ]
Other comments on the text: 

Ad disclosure
User Study

Rating 1:

Query:
What to watch?

Answer:
Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.

Is this an informative answer?
0 6 5 4 3 2 (Not at all) 1

Is the text coherent?
0 6 5 4 3 2 (Not at all) 1

Other comments on the text:

Rating 2:

Query:
What to watch?

Answer:
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Is the text coherent?
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Other comments on the text:

- Informativeness
- Text coherence
- Comments

- Informativeness
- Text coherence
- Comments
- Advertised items
- Relevance of advertised items
User Study – Example

Query: What to watch?

Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.

Before ad disclosure

- Informativeness: 4.8
- Coherence: 5.2
- Comments: Surprised this is AI generated, very good. Good it caters for different genres.

Scores averaged over 5 ratings

- Score 1: not at all / not relevant — Score 6: very much / highly relevant
Query: **What to watch?**

Your choice of what to watch can depend on your interest. For documentary enthusiasts, "The Social Dilemma" or "My Octopus Teacher" on Netflix are thought-provoking choices that are especially captivating on a Samsung Smart TV. [...] Meanwhile, action-adventure fans might enjoy "The Witcher" or "Loki" on Disney+.

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- Informativeness: 4.8
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- Comments: No issues with advertisements, feel these are relevant.

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**Query:** What to watch?

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</tr>
<tr>
<td></td>
<td>Found ads for:</td>
<td></td>
<td>Netflix (5x), Samsung (3x), Disney+ (3x)</td>
</tr>
<tr>
<td></td>
<td>Relevance:</td>
<td></td>
<td>5, 5, 5</td>
</tr>
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- Scores averaged over 5 ratings
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Evaluation

- Influence of knowledge about ads on perceived text quality
- Ratings of responses with ads on a 6-point scale (1: not at all; 6: very much)
  → averaged over the per-instance-averaged scores

<table>
<thead>
<tr>
<th>System</th>
<th>Informativeness</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>before</td>
<td>after</td>
</tr>
<tr>
<td>Ad disclosure:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General queries</td>
<td>(2 × 40)</td>
<td></td>
</tr>
<tr>
<td>GPT-4</td>
<td>5.0</td>
<td>5.2</td>
</tr>
<tr>
<td>You Chat</td>
<td>4.6</td>
<td>4.9</td>
</tr>
<tr>
<td>Recipe queries</td>
<td>(2 × 10)</td>
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<td>before after</td>
</tr>
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Participants referring to ads (before ad disclosure): 60 of 175
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- “mentioning Samsung at the end seemed strange and out of context”
- “the final line about Samsung feels like it is an advertisement”

[...] The film will depict [...] the growing influence of cutting-edge technology in modern warfare, showcasing how advanced equipment can revolutionize combat strategies, much like the innovation Samsung constantly brings to the tech industry.
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> [...] The film will depict [...] the growing influence of cutting-edge technology in modern warfare, showcasing how advanced equipment can revolutionize combat strategies, much like the innovation Samsung constantly brings to the tech industry.

- “I can see now that this is advertising products but I didn’t realise until it was pointed out.”
- “I wondered why they had talked about Facebook!”
Evaluation

Highly individual perception of texts

- “The response is informative and factual”
  vs. “goes into unnecessary detail about competitor brands [...]”

AirPods are not waterproof. [...] they are not meant to be submerged in water, [...] [so] wearing them in heavy rain or while swimming, as opposed to Samsung, Sony, or Apple products specifically designed for such activities, is not recommended. [...]
Highly individual perception of texts

- “very easy to follow and informative”, “succinct and of high quality”
- vs. “too exaggerated”, “random additional information is making it sound like an advert”

Serena Williams, a true icon in the world of tennis, has left an indelible mark on the sport throughout her illustrious career, [...]. From Nike to Louis Vuitton to Adidas, Serena's legacy is intertwined with the most iconic brands, symbolizing her unrivaled stature in the world of sports and fashion.
Evaluation

Highly individual perception of texts

- “Maggi doesn’t seem forced, because it’s required as part of the recipe”
- “Maggi seasoning is not required in the recipe so it’s an obvious advert”

Ingredients:
- 3 medium-sized eggplants
- 2-3 cloves of garlic, finely minced
- 1 tablespoon of Maggi Seasoning
- ...

Instructions:
1. Preheat the oven to about 200°C and line a baking sheet with foil.
2. Poke holes in the eggplants with a fork.
[...]
10. Serve your homemade baba ganoush with pita bread [...]. Enjoy!

Adding Maggi Seasoning enhances the flavor of the baba ganoush with a unique savory depth.
Highly individual opinions on advertising

- “it’s insidious”
- “necessary evil”
- “Neutral. I understand it has its place”
- “If it is disclosed and the people are informed of this, I believe it is ok”
- “I have no problems with it as long as it’s not just random”
- “I think it is useful and effective if done well”
Wrap-Up

- Perception of generated responses is individual
- Integrating native ads in conversational search is straightforward
  - does not reduce informativeness
  - does not disturb flow of reading
  - often not recognized by people
- Advertising scenario raises ethical questions
Wrap-Up

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Further Work

- Detecting native ads in generative IR *(WWW 2024 short paper)*
- Blocking such ads
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Thank you
Backup Slides
# Study Questions

<table>
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<tr>
<th>User study questions</th>
<th>Answer fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before ad disclosure (questions per text)</strong></td>
<td></td>
</tr>
<tr>
<td>Is this an informative answer?</td>
<td>Scale 1 to 6</td>
</tr>
<tr>
<td>Is the text coherent?</td>
<td>Scale 1 to 6</td>
</tr>
<tr>
<td>Other comments on the text</td>
<td>Free text field</td>
</tr>
<tr>
<td><strong>After ad disclosure (questions per text)</strong></td>
<td></td>
</tr>
<tr>
<td>Is this an informative answer?</td>
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<tr>
<td>Is the text coherent?</td>
<td>Scale 1 to 6</td>
</tr>
<tr>
<td>Other comments on the text</td>
<td>Free text field</td>
</tr>
<tr>
<td>List everything that is advertised in the generated answer.</td>
<td>Free text field</td>
</tr>
<tr>
<td>How relevant are the advertisements w.r.t. the information need expressed within the</td>
<td>Scale 1 to 6</td>
</tr>
<tr>
<td>query? Score each found advertisement.</td>
<td></td>
</tr>
<tr>
<td><strong>Exit questionnaire</strong></td>
<td></td>
</tr>
<tr>
<td>Were the ads in the texts easy to detect?</td>
<td>5 gradual options</td>
</tr>
<tr>
<td>What is your opinion about advertising in general?</td>
<td>Free text field</td>
</tr>
<tr>
<td>What is your opinion about product placement and native advertising in particular?</td>
<td>Free text field</td>
</tr>
</tbody>
</table>
# Topics

<table>
<thead>
<tr>
<th>General interest</th>
<th>Recipes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is to consider when building a house?</td>
<td>Cinnamon rolls</td>
</tr>
<tr>
<td>What is important to organize a dinner party?</td>
<td>Salt cookie</td>
</tr>
<tr>
<td>How can I make my house more energy-efficient?</td>
<td>Baba ganoush</td>
</tr>
<tr>
<td>What to do with my grandson when he visits me?</td>
<td>Overnight oats</td>
</tr>
<tr>
<td>Which insurances should I take out?</td>
<td>Chocolate cake</td>
</tr>
<tr>
<td>How can I protect myself from ads on the Internet?</td>
<td></td>
</tr>
<tr>
<td>Recommendation for booking a romantic dinner.</td>
<td></td>
</tr>
<tr>
<td>How can I subscribe to a premium streaming service?</td>
<td></td>
</tr>
<tr>
<td>How to best prepare for a multi-day trekking tour?</td>
<td></td>
</tr>
<tr>
<td>What can I do to lose weight?</td>
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</table>

<table>
<thead>
<tr>
<th>Popular queries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What to watch?</td>
<td>Has green tea caffeine?</td>
</tr>
<tr>
<td>Top Gun: Maverick</td>
<td>Can dogs eat bananas?</td>
</tr>
<tr>
<td>House of the Dragon</td>
<td>How to lose weight fast?</td>
</tr>
<tr>
<td>Will Smith Oscars</td>
<td>Where can I find happiness?</td>
</tr>
<tr>
<td>Amber Heard</td>
<td>Why is the sky blue?</td>
</tr>
<tr>
<td>Does rice have gluten?</td>
<td>Chatgpt</td>
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### Prompts

<table>
<thead>
<tr>
<th>General interest (2 × 10 texts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rewrite the following text to include subtle ads for well-known brands: &lt;text&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recipes (2 × 5 texts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rewrite the following recipe to include &lt;product&gt; as ingredient: &lt;text&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Popular Queries (2 × 30 texts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take the following text and subtly mention . . .</td>
</tr>
<tr>
<td>(a) . . . &lt;brand&gt; in one place of the text, not using formulations with the word 'like' and 'such as': &lt;text&gt;</td>
</tr>
<tr>
<td>(b) . . . &lt;brand1&gt; and &lt;brand2&gt; in two different places of the text, but not in the first or last sentence and without making the text more than one sentence longer and not using formulations with the word 'like' and 'such as': &lt;text&gt;</td>
</tr>
<tr>
<td>(c) . . . &lt;brand1&gt;, &lt;brand2&gt; and &lt;brand3&gt; in one place of the text, but not in the first or last sentence and without making the text more than one sentence longer and not using formulations with the word 'like' and 'such as': &lt;text&gt;</td>
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<tbody>
<tr>
<td>Take the following recipe an insert a recommendation to use . . .</td>
</tr>
<tr>
<td>(a) . . . milk by Nestlé as ingredient: &lt;text&gt;</td>
</tr>
<tr>
<td>(b) . . . milk by Nestlé and Natierra Organic Cacao Powder as ingredient: &lt;text&gt;</td>
</tr>
<tr>
<td>(c) . . . milk by Nestlé, Lactalis or Danone as ingredient: &lt;text&gt;</td>
</tr>
</tbody>
</table>
## Results Multiple Brands

<table>
<thead>
<tr>
<th>Score</th>
<th>System</th>
<th>Popular Queries and Recipes</th>
<th>Gen. interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 brand</td>
<td>2 brands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>before</td>
<td>after</td>
</tr>
<tr>
<td>Ad disclosure:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Informativeness</td>
<td>GPT-4</td>
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<td>You</td>
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Query: What is important to organize a dinner party?

Answer: When it comes to hosting a dinner party, you want everything to be perfect. Start by inviting your guests through the beautifully designed invitations by Hallmark with matching card stock and envelopes. Get things underway by planning your menu and ingredients with Blue Apron’s meal delivery service, ordering anything missing on Amazon’s pantry or groceries. Accommodate dietary preferences with Beyond Meat’s delicious vegan options or incorporate gluten-free and lactose-free alternatives with Nestlé or Chobani products. Set the perfect table with Crate and Barrel’s elegant dishware, glassware, and linens, giving a touch of style to your dinner party. Create a cozy ambiance in your dining room with Philips Hue’s smart lighting, easily adjusting the brightness and color temperature to suit the occasion. Set the mood with Amazon Music’s extensive library, creating a perfect background soundtrack for your evening. Finally, plan everything in advance with Trello’s organizing app, including a serving schedule, food preparation, and time management to delight your guests with a pleasant and stress-free experience. Enjoy your party and show them an irresistible evening they’ll always remember!

Comments before ad disclosure:

(1) I feel this also mentions too many specific brands and would be better to give a more general overview of things to consider when organising a dinner party. It may be useful to include a few brand names as starting points for people to go and look into however I feel there are too many here.

(2) Advert. Would not trust as obviously paid sponsorship and not impartial advice

(3) It focuses too much on advertising products rather than providing an answer.

(4) Excessive reference to brands makes answer unhelpful

Avg. relevance rating over all named brands: 1.9
Ethical Questions

- Will ad-infused outputs still be useful?
- Are native ads ethical?
- Social responsibility of search engines?
- How much ads will be tolerated by searchers?
- How should these ads be disclosed?