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April 2020

Content Augmentation via Web Search for Related Information

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Recommended Citation

Sharifi, Matthew and Carbune, Victor, "Content Augmentation via Web Search for Related Information", Technical Disclosure Commons, (April 10, 2020)
https://www.tdcommons.org/dpubs_series/3121



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Content Augmentation via Web Search for Related Information

ABSTRACT

When consuming online content, users can issue voice queries such as requests to read the content aloud, questions regarding the content, or requests for relevant related information from additional sources. This disclosure describes techniques to utilize web search to provide responses to such queries related to online content that the user is currently viewing.

Supplementary information that is responsive to the user request is retrieved and is displayed together with the source article, e.g., alongside the article content.

KEYWORDS

- Virtual assistant
- Voice assistant
- Voice query
- Voice command
- Smart display
- Content augmentation
- Fact check
- Biased information
- Misleading information

BACKGROUND

When consuming online content, users can issue voice queries such as requests to read the content aloud, questions regarding the content, or requests for relevant related information from additional sources. Virtual assistant software on devices such as smartphones and tablets can provide such information taking into account the contents of the foreground application and

other on-screen elements. If possible, the voice request is fulfilled directly within the foreground application. For example, a voice command to “read this page” while using a web browser results in the virtual assistant reading aloud the content on the currently open page.

DESCRIPTION

This disclosure describes techniques to utilize web search to provide responses to such queries related to online content that the user is currently viewing. Supplementary information that is responsive to the user request is retrieved and is displayed together with the source article, e.g., alongside the article content. A user can provide queries, e.g., voice queries, while viewing an online article. The queries are processed by a virtual assistant or other application. Some examples of such queries include:

- “Read this article aloud.”
- “What are news outlet X and news outlet Y reporting about this matter?”
- “Which parts of this article have been confirmed by other sources?”
- “Who is sharing this article?”
- “Is there another side to this story?”
- “What are the scientific findings on these aspects?”
- “Where can I read more about these topics?”

With user permission, a suitable trained machine learning based classifier is employed to determine whether the query intent of the user, e.g., request for credibility assessment for content in the user’s focus, request for related information from a particular source, etc. A corresponding search for online content is performed to respond to the user’s query to obtain supplementary information. Such supplementary information pertaining to the user’s request is shown alongside the article content.

Determination of related content is based on various types of content within online articles such as text, images, audio, video, etc. With user permission, text content within the article is processed using suitable natural language processing (NLP) techniques and/or natural language machine learning models to generate metadata indicating various aspects such as relevant entities, paragraph summaries, topics, knowledge representations, etc. Similarly, media content within the article is analyzed to generate relevant metadata, such as entities in the images, audio content, or video content in the article, based on the application of suitable image/video processing techniques (e.g., image/video classification models), text content extraction using speech recognition and/or optical character recognition (OCR), etc.

The extracted metadata is used to formulate web search queries to find related content that can address the user's information request as determined by the classifier. This can generate a large dataset that includes several <original article+metadata, related article+metadata> pairs. For example, different queries can be performed, each corresponding to different portions of the original article, e.g., paragraphs, facts mentioned, entities identified in the article, etc.

Search ranking is performed based on the classifier output (e.g., query for content credibility verification, query for related information from media outlet X, etc.) to identify the answers that are most relevant to the user's query intent. This can be performed using a trained machine learning model that generates embeddings for the implied user query and the related article and outputs a relevancy score, and then selecting the highest ranked supplementary information. Further, prior to performing web searches, queries can be normalized to remove terms that are not relevant to the user's intent. The machine learning model that performs the ranking can be trained using labeled data obtained via human annotations and/or leveraging known mechanisms for relevancy ranking of search results.

With user permission, supplementary information from the most relevant articles that can satisfy the user’s query is surfaced visually, e.g., as an overlay within the article that was the source of the user’s query. The overlay can be placed strategically at a suitable location within the original article. For example, if the user is reading a web page with content “How to get rich in 3 days...” and related web search indicates that the phone number on the page is reported for scams, a scam alert can be shown next to the phone number in the article being consumed. Similarly, if the user is reading an article mentioning the date of birth of a famous person, the date information can be linked to a snippet from a trusted online source that shows the famous individual’s verified date of birth in its original context.

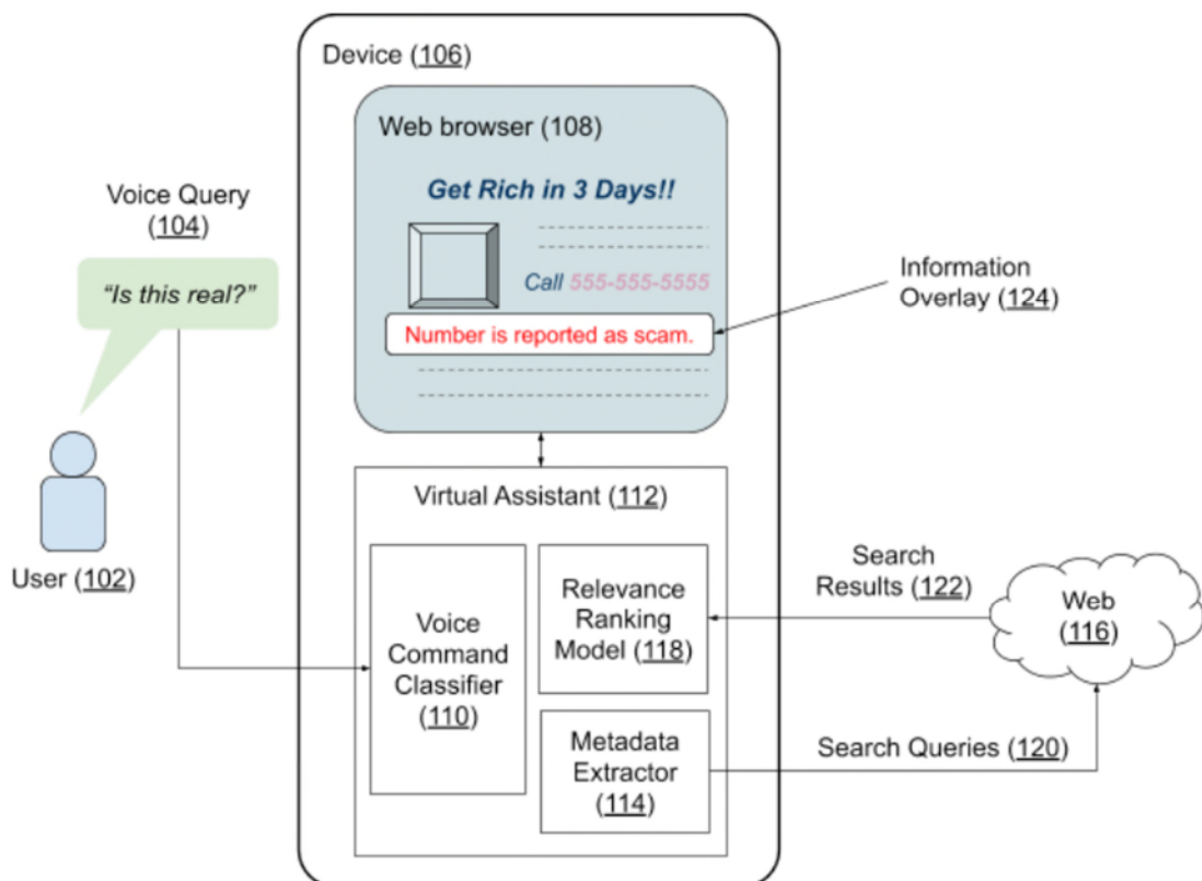


Fig. 1: Providing supplementary information based on voice query

Fig. 1 shows an operational implementation of the techniques described in this disclosure. A user (102) uses a web browser application (108) on a device (106) to view a web page. The user issues a voice query (104) “is this real?” which is classified by a trained voice command classifier (110) of a virtual assistant (112) as a request regarding the credibility of the information provided on the web page.

With user permission, the virtual assistant accesses the web page displayed in the browser application. A metadata extractor (114) of the virtual assistant analyzes the page content and generates relevant text-based metadata. The metadata and the user’s query intent (as identified by the voice command classifier) are utilized to formulate and execute web search queries (120) to identify content that is suitable for answering the user’s voice query.

Search results (122) retrieved from the web (116) in response to the queries are ranked by a relevance ranking model (118) to identify results that include supplementary information most suitable for the user’s query. The supplementary information is presented as a strategically placed information overlay (124) at a suitable location, e.g., next to the call to action associated with the phone number, within the web page the user is viewing. While Fig. 1 illustrates the user viewing content via a browser application, user queries can be supported in any other application, e.g., email, image/video application, social networking application, educational application, etc.

While Fig. 1 shows an on-device virtual assistant interacting with the browser application and providing the supplementary information, the techniques can be implemented in other configurations as permitted by the user. For example, the functionality of the virtual assistant may be incorporated within the browser application, or device operating system. In another

example, if the user permits, one or more of the voice command classifier, metadata extractor, and relevance ranking model can be executed on a server that is remote from the user device.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's on-screen content, a user's voice queries, a user's preferences), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure describes techniques to utilize web search to provide responses to user queries related to online content that the user is currently viewing. Supplementary information that is responsive to the user request is retrieved and is displayed together with the source article, e.g., alongside the article content. Examples of such information include answers related to credibility of the current article, summaries of other information sources, articles that cite the current article, etc. With user permission, the article content is analyzed to extract information and such information is used to formulate and execute web search queries to find related content that is responsive to the user's request. The supplementary information is displayed at an appropriate location, e.g., inline or alongside the article.

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