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## User Interface To Present Query Responses Separated By Data Sources

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## **User Interface To Present Query Responses Separated By Data Sources**

### **ABSTRACT**

Pieces of information that are responsive to user queries are typically personalized to the user. Information delivered in response to the user's query can be derived from a variety of data sources, some of which are on the user's device and some that are online. However, the response is typically delivered independent of the underlying data source from which the information is obtained. As a result, the user interface that shows the results does not enable a user to determine whether the response is based on public or user-specific information and whether it was retrieved from online or local data sources. This disclosure presents UI techniques that provide a visual mechanism to help surface the underlying source(s) of data from which responses to the user's query are derived.

### **KEYWORDS**

- Search query
- Voice assistant
- Virtual assistant
- Data source
- Private data
- On-device content
- Owned content
- Content suggestion

### **BACKGROUND**

Users often seek answers to various questions via virtual assistants, provided via user devices such as smartphones, smart speakers, and other appliances. With user permission, results

that include information that is responsive to the user's query are identified and personalized to the user and relevant aspects of the user's context. Information that is delivered in response to the user's query can thus be derived from one or more of the following data sources:

1. Online information available publicly to anyone;
2. User's own information stored online (e.g., on cloud platforms); and
3. User's own information stored locally on the user's device.

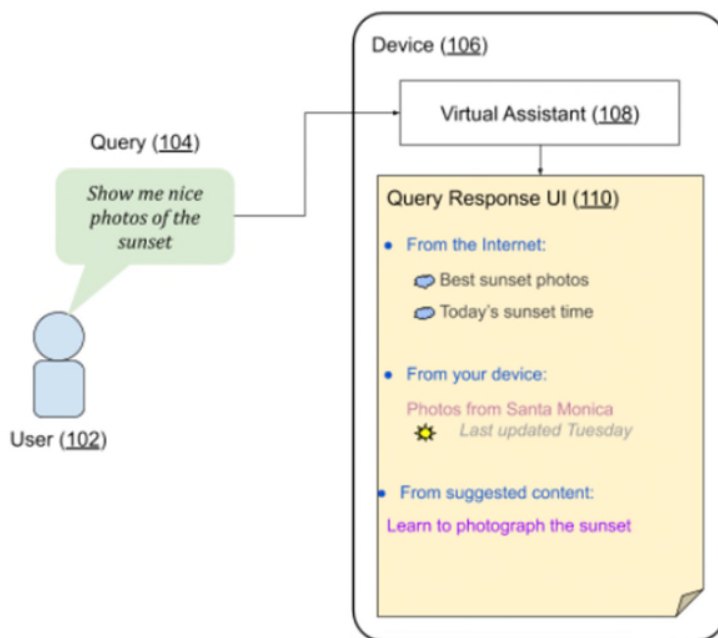
The response to the user's query based on the above data sources can be in a variety of forms, such as: specific pieces of information, recommendations for content, suggestions for actions to be taken via the device user interface (UI), etc. However, the response is typically delivered independent of the underlying data source from which the information is obtained. As a result, the user interface that shows the results does not enable a user to determine whether the response is based on public or user-specific information and whether it was retrieved from online or local data sources.

#### DESCRIPTION

This disclosure presents UI techniques that provide a visual mechanism to help surface the underlying source(s) of data from which responses to the user's query are derived. The user interface serves to enhance the quality and utility of the delivered response by helping users easily understand the source and scope of the provided information.

Delivery of the user interface involves two steps. With user permission, a first step includes identifying the various pieces of information relevant to a user's query and separating them according to the underlying data source. Subsequently, a second step includes delivering the response UI such that information from different data sources is marked as such and is

presented with clear visual separation such that users can connect results to the respective underlying data sources.



**Fig. 1: Separating responses to the user's query based on the underlying data sources**

Fig. 1 shows an example user interface per an operational implementation of the techniques described in this disclosure. A user (102) issues a query (104) to a user device (106) which is processed by a virtual assistant (108) that is configured to identify responsive information from on-device and online data sources, with user permission to access the different data sources.

Responses to the user's query (110) are shown separated by the source of the data that generated the result. For example, in Fig. 1, the user query relates to nice photos of the sunset. The response shows: (i) results from the Internet related to publicly available sunset photos and information; (ii) photos from the user's device that depict sunset; and (iii) query-relevant recommended content that can help the user learn how to photograph the sunset.

The UI presentation is adapted based on availability screen real estate. For example, on devices with smaller screen sizes (e.g., smartphones), visual cues pertaining to data sources can be arranged more densely or presented within a layered hierarchy, with the user being able to access each successive layer on-demand as needed. For instance, on mobile devices, the presentation of the data source cues can use UI techniques similar to those used for Chinese-Japanese-Korean (CJK) language character input. Fig. 2 shows an example implementation of such a scenario where limited screen real estate is further constrained by the on-screen keyboard as seen in Fig. 2(a). Results from additional data sources are initially collapsed (112) to save screen space. As needed, the user can choose to expand the content to reveal the full set of results as shown in Fig. 2(b).

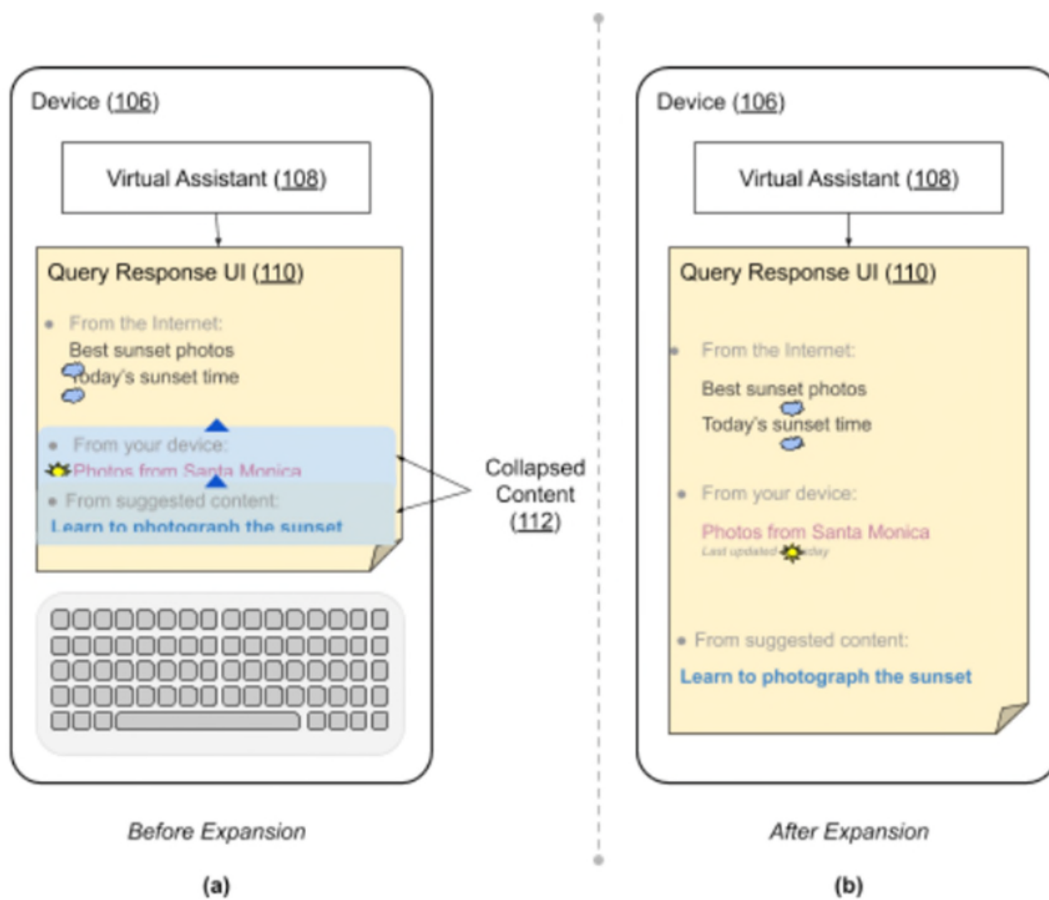


Fig. 2: On-demand expansion of data sources initially collapsed to save screen space

The described user interface techniques can be utilized to deliver query responses on any user device via a virtual assistant, search engine, or other application. For instance, with user permission, search engines can use the techniques when delivering a ranked list of search results and/or query suggestions. The user interface techniques can also be utilized to deliver results for queries issued via any suitable mechanism, such as voice, text, etc. Implementation of the described techniques can promote greater understanding of the data source(s) underlying system responses, thus promoting greater transparency and understanding, and enhancing the user experience (UX) of the system.

Separation of results by data sources provides a clear indication to the user of the data source utilized to respond to the query. In particular, information from private data sources (e.g., user's collection of photos stored locally or on-cloud, user's messages, etc.) can be perceived as distinct from information from public data sources. Further, on-device data sources can be shown distinct from other sources. In this manner, users can easily determine which data sources are used for responses to specific queries, and control access to such information.

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 social network, social actions or activities, profession, a user's preferences, or a user's current location), 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, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of

a user cannot be determined. 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 presents UI techniques that provide a visual mechanism to help surface the underlying source(s) of data from which responses to the user's query are derived. Specifically, the UI is delivered such that information from separate data sources is marked as such and is presented with clear visual separation to enable users to connect results to the respective underlying data sources. The described techniques can be incorporated within any application that delivers responses to user queries. The UI presentation can be customized based on availability screen real estate. Implementation of the described techniques can help promote greater understanding of the data source(s) underlying system responses, thus providing greater transparency and understanding, and enhancing user experience.