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Contextual recipe recommendations

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Contextual recipe recommendations

ABSTRACT

Online services provide recipe recommendations to users on a variety of endpoint devices. When recipe recommendations are provided based on a user's long-term preferences, such recommendations may not be best suited to the user's current context. This disclosure describes techniques to provide context-aware recipe recommendations when users provide permission to determine the context. Context determination can include, e.g., analysis of recent user queries to a virtual assistant or a search engine to identify triggering queries that are associated with food. A machine learning model is used to map queries to user intent. Recipes associated with the determined user intent are retrieved and provided to the user.

KEYWORDS

- Recipe recommendation
- Food recommendation
- Contextual recommendation
- User context
- Virtual assistant
- Smart display
- Recommender system
- Recommendation model

BACKGROUND

Online services provide recipe recommendations to users on a variety of endpoint devices such as laptops, tablets, smartphones, smart speakers, smart displays, smart appliances, etc. When recipe recommendations are provided based on a user's long-term preferences, such

recommendations may not be best suited to the user's current context. For example, a user that has recently purchased a sous vide machine is likely to be interested in sous vide recipes, which may not be indicated by their longer term preferences. In another example, a user that is hosting a large event, e.g., a birthday party for children, is likely to be interested in recipes suitable for the event which may be different from recipes that are identified based on user's previously expressed preferences. Recipe recommendations that take into account a user's current interests, contexts, and/or preferences can thus be more relevant and be of greater interest to a user.

DESCRIPTION

This disclosure describes techniques to provide context-aware recipe recommendations when users provide permission to determine the context. Context determination can include, e.g., analysis of recent user queries to a virtual assistant or a search engine to identify triggering queries that are associated with food. With user permission, search engine logs are processed for triggering queries that are associated with food and cooking. The user context is determined based on recent user search activity that includes recipe based and non-recipe based queries. If permitted by the user, context can be determined from other user data such as recent photos taken by the user, user's communications such as email, etc. Only such data as the user has permitted is accessed and the data is used specifically to generate recipe recommendations. Users are provided with options to limit access to data or to turn off contextual recommendations entirely.

With user permission, queries are analyzed to identify triggering queries, e.g., queries that are related to diets/restrictions (for example, queries that include search terms such as keto, low carb recipes, healthy recipes, vegan, etc.); cooking equipment (for example, air fryer

recipes, slow cooker recipes, etc.); queries pertaining to recipe categories (for example, easy dinner recipes, easy recipes, stir fry recipes, one pot recipes, etc.); cooking ingredients (for example, chicken, ground beef, pork chop, shrimp, eggplant, quinoa, etc.); or cuisine (for example, Chinese food, Mexican recipes, Indian recipes, etc.).

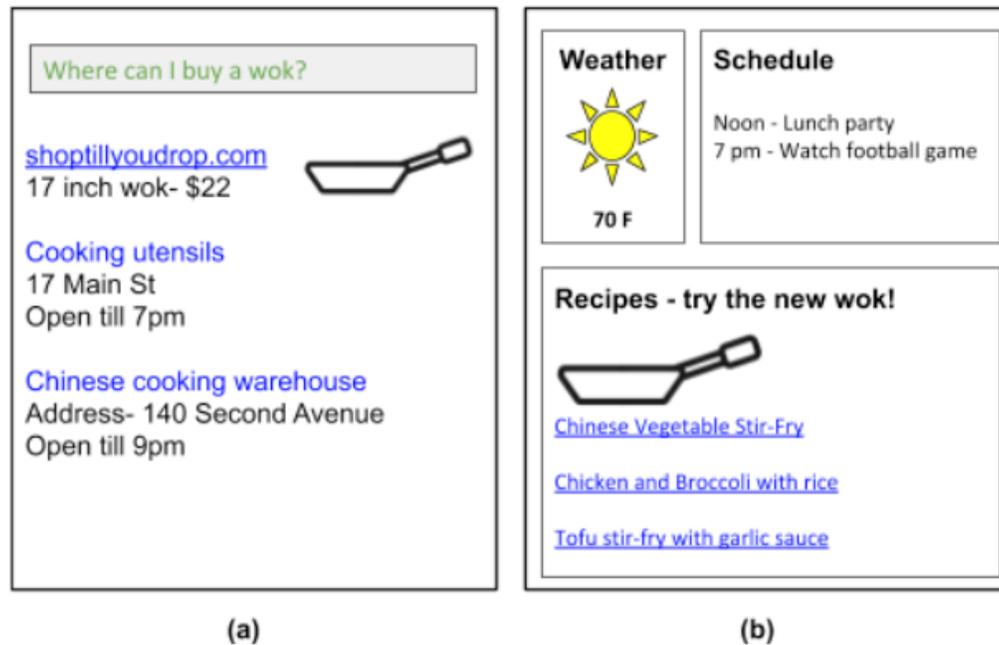


Fig. 1: Displaying recipe recommendations based on recent search queries

Fig. 1 illustrates an example of a context-aware recipe recommendations, per techniques of this disclosure. Fig. 1(a) illustrates that a user has conducted research using a search engine related to purchase of a wok. The query is identified as a triggering query (“kitchen equipment”). The user intent is determined, e.g., that the user may be interested in preparation of food that involves the use of a wok. While Fig. 1(a) illustrates text queries via text, other user data such as visual queries (where the user performs search by providing an image of a wok); purchases (that the user recently ordered a wok); or other user data, can also be utilized as a triggering query, when permitted by the user.

Fig. 1(b) illustrates an example user interface of a user device where the user is provided with recipe recommendations, e.g., in the form of a recommendation card or panel. For example, the recommendation may be provided on a smart display that is located in the user's kitchen, or on another device associated with the user. In this illustrative example, recipes that involve the use of a wok ("Chicken Vegetable Stir-Fry, "Chicken and Broccoli..." "Tofu stir-fry") are provided to the user. The user can select a recipe to view details, to receive audio and/or video instructions, etc.

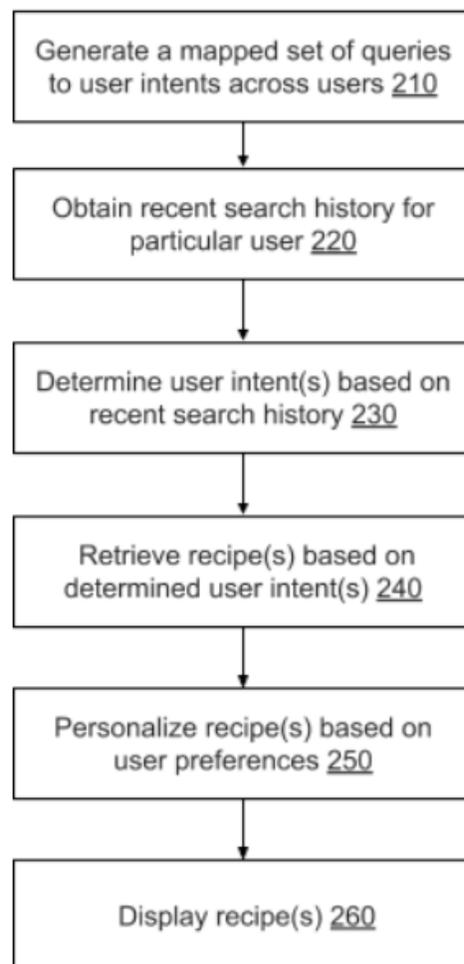


Fig. 2: Generation of context-aware recipe recommendations

Fig. 2 illustrates an example workflow for the generation of context-aware recipe recommendations, per techniques of this disclosure. User queries are mapped to user intent (210). For example, the search queries with keywords “wok,” “where can I buy a wok,” “stir fry,” etc. can all be mapped to a user intent to “stir fry.” The intent mapping analysis is performed using queries for which the user has provided permission for such analysis. A machine learning model can be trained to perform the mapping of queries to user intent. A knowledge engine can also be used to create a map of queries to entities, which are mapped to recipes.

At a time of recipe recommendation generation for a particular user, with user permission and express consent, recent user search history for that particular user is obtained (220). User intent is determined (230) based on the queries in the recent user search history using the machine learning model and the previously generated mapping of search queries to user intent.

Recipes associated with the determined user intent(s) are retrieved (240). When the user permits, the recipes are personalized (250) to user preferences associated with the particular user. For example, the user may specify a preference for a type of diet or cuisine which is then used to select a subset of the retrieved recipes which are displayed (260) on a user device of the particular user.

The techniques of this disclosure can be utilized to provide context-aware recipe recommendations that promote user engagement. For example, searches for “wok,” “where can I buy a wok,” “price of a wok,” etc. can be interpreted as an intent and the user can be provided recipe recommendations for stir fry recipes; a search for “ground beef” by a user can trigger recipe recommendation for recipes that include ground beef as an ingredient; a search for “keto

diet” lead to recommendations being provided for keto-friendly recipes; a search for “how to plan a kid's birthday party” to recommendations for kid-friendly recipes; etc.

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

Online services provide recipe recommendations to users on a variety of endpoint devices. When recipe recommendations are provided based on a user’s long-term preferences, such recommendations may not be best suited to the user’s current context. This disclosure describes techniques to provide context-aware recipe recommendations when users provide permission to determine the context. Context determination can include, e.g., analysis of recent user queries to a virtual assistant or a search engine to identify triggering queries that are associated with food. A machine learning model is used to map queries to user intent. Recipes associated with the determined user intent are retrieved and provided to the user.

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