April 2022

Personalized Health Reminders in the Voice of a Trusted Caregiver

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<u>ABSTRACT</u>

Some health management applications and devices include functionality to help remind users to take their pills. However, such reminders often lack relevant detail, such as name and dosage of the specific medication. Further, no mechanisms exist for caregivers to access health-related information of consenting users, e.g., for children to access information of elderly parents, or to remind them of health-related tasks. This disclosure describes techniques that enable a user to receive health-related reminders based on photos of their medication. The notifications can use the voice of their preferred caregivers, such as their adult children. Suitable computer vision and machine learning techniques are utilized to generate such notifications. The application via which reminders are delivered is made available in many languages and with appropriate permissions, can automatically generate voice reminders in the voice of caregivers.

<u>KEYWORDS</u>

- Health companion
- Fitness app
- Health app
- Caregiver
- Medicine dosage
- Medication
- Prescription
- Fitness tracker
- Medical record

BACKGROUND

People on medication need to follow the prescribed schedule and dosage for taking their medicines. However, people can forget to take their pills on time. Some devices and applications designed for health management include functionality to help remind users to take their pills. Currently, such reminders lack relevant detail, such as name and dosage of the specific medication. Without such detail, the reminders are less useful, especially for those who need to identify medicines based on packaging and appearance, e.g., because they lack the ability to read the medicine label, which is often in English and not in a local language; those with visual impairments; etc. Moreover, such devices and applications cannot be personalized, lack support for internationalization, and their availability is typically restricted to only a small set of countries or regions.

Further, in many countries, health-related information is not available in digital form. Even in countries where most health records are digital, there is a lack of seamless integration across providers. Lack of integrated access to digital health records is a challenge that limits the extent to which existing health companion solutions can support user needs for reminders and other health-related support mechanisms.

People also receive health-related support from others. For example, such caregivers can be professionals, such as nurses, or personal contacts, such as family and/or friends. For instance, software that supports fitness tracking devices includes family plans that enable parents to set up their children's devices and to view fitness-related information captured by such devices. However, current devices and applications lack similar mechanisms for adults to access health-related information of other consenting adults, e.g., elderly parents, in order to perform caregiving duties, such as medicine reminders, fitness tracking, wellness checks, etc. In addition,

voice output (e.g., used for reminders or alerts) of existing solutions uses a set of generic voices, thus lacking the personal touch of the voice and accent of someone familiar.

DESCRIPTION

This disclosure describes techniques that enable a user to receive personalized health-related reminders that include photos (or other visual indicators) of their medication. With appropriate permissions and configuration, the notifications can be delivered in the voice of their preferred caregivers. Each notification is linked to a dosage guide that shows a photo of the corresponding medicine and its packaging. Upon providing a confirmation that the dose is taken, the user can be shown supportive content, with permission. The user can receive notifications on one or more suitable devices, such as smartphones, smartwatches, fitness trackers, etc., and transfer those for viewing to any device with suitable display capabilities.

The described functionality can be realized by having users upload photos of the medicines prescribed by their healthcare provider and input the corresponding dosage instructions. With permission, caregivers such as adult children, can upload voice messages to act as reminders for the user to take the medicine. With specific permissions from the caregiver and the user, a suitable trained machine learning model on the user's device can generate a variety of reminders in the caregiver's voice. For instance, different voice reminders can be generated for each medicine and dosage. Based on the medicine photos and caregiver voice messages, the user can begin the dosage routine and receive reminder notifications in the caregiver's voice at appropriate times.
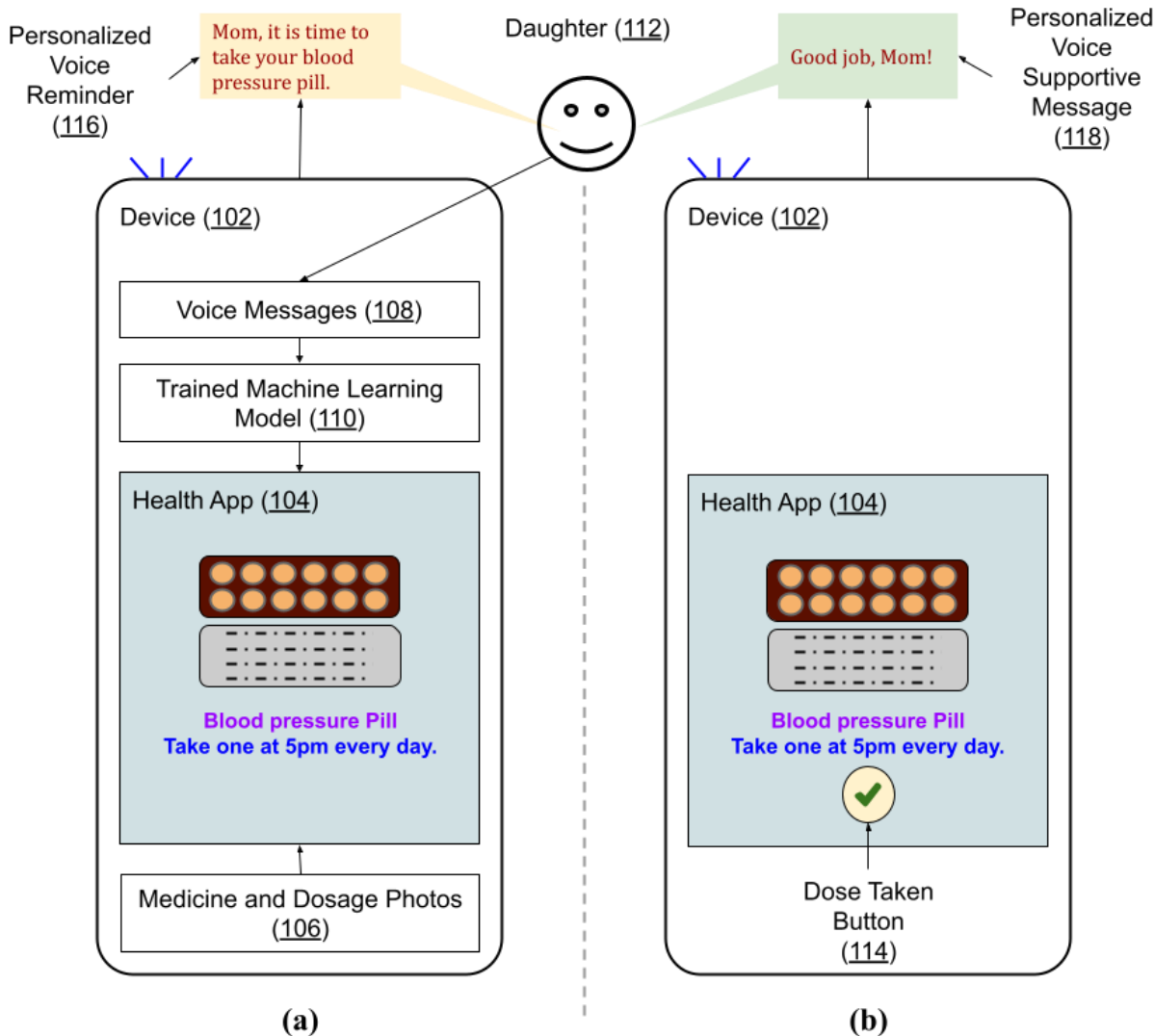
Fig. 1: Delivering personalized notifications in the voice of a trusted caregiver

Fig. 1 shows an example of operational implementation of the techniques described in this disclosure. A user adds an entry for a prescribed blood pressure medication by uploading photos of the pills and corresponding dosage information (106) in a health app (104) on the user's device (102). As shown in Fig. 1(a), voice messages (108) uploaded by a trusted caregiver, e.g., the user's daughter (112), are used directly, or are used with permission by a trained machine model (110) to provide a personalized notification in the daughter's voice (116). The notification serves to remind the user to take their blood pressure pill. As shown in Fig. 1(b),

the user checks a "Dose Taken" button (114) within the app to indicate having acted on the notification and taken the medicine as prescribed. The user then receives a supportive message of encouragement in the daughter's voice (118).

With the user's permission, photos of medicines and/or dosage instructions can be analyzed by employing computer vision techniques to obtain the medicine name and dosage in text format. Alternatively, or in addition, computer vision techniques can be applied to verify that the user is taking the correct medicine by having the user hold the medicine in front of a device camera prior to taking the dose corresponding to a reminder. Such verification can ensure that users take correct medicine doses.

The operations can additionally include other types of personalized reminder notifications connected to health, fitness, or wellness matters, such as exercising, hydration, etc. Moreover, with permission, the techniques can be provided in the form of a family plan for a health application that enables designated caregivers such as adult children to care for users and be aware of their well-being even when they are geographically distant. Such family plans can further serve as a single trusted repository for digital health records of the whole family, thus enabling family members to stay informed of health-related developments, such as new tests for a family member.

The personalized reminders and other health features described herein can be provided via any device, application, or service that serves user needs for health, fitness, wellness, or other relevant matters. The features are implemented with specific user permission and in compliance with regulations and best practices regarding health information. Additionally, virtual assistants can also provide these features. Moreover, the techniques can be made available to external

parties for integration within their solutions via any suitable mechanisms, such as an application programming interface (API).

The techniques can be internationalized for local language support to make it possible to use them across the globe by users of any age. Implementation of the techniques to generate and deliver personalized reminders in a familiar voice enhances the user experience of using devices and applications while supporting better health and well-being. The techniques can further help families and friends care for each other's health and well-being, thus enhancing their sense of connection.

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 medications, social network, social actions or activities, 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

Some health management applications and devices include functionality to help remind users to take their pills. However, such reminders often lack relevant detail, such as name and

dosage of the specific medication. Further, no mechanisms exist for caregivers to access health-related information of consenting users, e.g., for children to access information of elderly parents, or to remind them of health-related tasks. This disclosure describes techniques that enable a user to receive health-related reminders based on photos of their medication. The notifications can use the voice of their preferred caregivers, such as their adult children. Suitable computer vision and machine learning techniques are utilized to generate such notifications. The application via which reminders are delivered is made available in many languages and with appropriate permissions, can automatically generate voice reminders in the voice of caregivers.

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