November 2020

Techniques to Quickly Save Reminders and Be Reminded at the Right Time

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Abstract:

This publication describes techniques for setting context-based reminders on a computing device responsive to receiving user input. A user triggers the Reminder Manager on the lock screen of a computing device to input information (*e.g.,* text, audio, image) relevant to a desired reminder. The Reminder Manager receives the input, determines context associated with the input, generates a prediction of a reminder desired by the user based on the input and context, and prompts the user of the reminder at the right time. A machine-learned model implemented on the computing device may use semantic contextual understanding to determine the context of the input. The Reminder Manager then creates a reminder on the computing device that best meets the user's needs. At the right time, the computing device presents the reminder to the user along with the input originally provided.

Keywords:

Reminder, notification, alarm, machine learning, machine-learned model, artificial intelligence, predictive reasoning, smartphone, user equipment, semantic contextual understanding, application, context, user input

Background:

Users frequently set reminders on their computing devices (*e.g.*, a smartphone), for example, to remind them of important ideas or events (*e.g.*, where their car is parked), to add an item to a grocery list, or to remember to make a call at a later time. A process for setting a reminder

can vary across computing devices, oftentimes requiring a user to undertake a number of steps to complete their task. In an example, to create a useful reminder in a reminder application, a smartphone user may need to unlock the screen, navigate to the reminder application (*e.g.*, an application installed on the smartphone), create a new reminder, provide detailed information about the type of reminder, desired time of notification, and future action needed to complete the task, and save the reminder. During this time, the user can become burdened by the number of required transactions and either become distracted or forget to set their reminder. Users do not always have the time or desire to provide detailed information required to create a useful reminder. Furthermore, the restricted formats (*e.g.,* short text description, time) can provide opportunities for information to become lost. As a result, many users do not utilize the functionality provided by reminder applications.

Description:

This publication describes techniques for setting context-based reminders on computing devices responsive to receiving user input. While the example computing device described in this publication is a smartphone, other types of computing devices can also support the techniques described herein.

A computing device may include one or more processors, transceivers for transmitting data to and receiving data from a base station (*e.g.*, wireless access point, another computing device), sensors (*e.g.*, a location sensor, a global navigation satellite system (GNSS) receiver, global positioning satellite (GPS) receiver, an image sensor), a computer-readable medium (CRM), and an input/output device (*e.g.*, a display, a speaker, a microphone). The CRM may include any suitable memory or storage device, for example, random-access memory (RAM), static RAM

(SRAM), dynamic RAM (DRAM), non-volatile RAM (NVRAM), read-only memory (ROM), or flash memory. The CRM includes device data (*e.g.,* user data, multimedia data, applications, and/or an operating system of the device), which are executable by the processor(s) to enable the techniques described herein. The device data may include a Reminder Manager. The computing device performs operations under the direction of the Reminder Manager to collect input from the user, determine the input context, determine the optimal reminder, and remind the user at the right time.

As illustrated in Figure 1, the user activates (triggers) the Reminder Manager, for example, by a preferential affordance on the lock screen. This could be a tap/press, a swipe from the side of the screen, or a particular way of lifting the device. After activating the Reminder Manager, the user may provide input to the computing device with details about the desired reminder. In an example, the user input may include selected text or other elements displayed on the user interface of the device, an audio recording taken by the user, an image taken with the camera of the computing device, and the like.

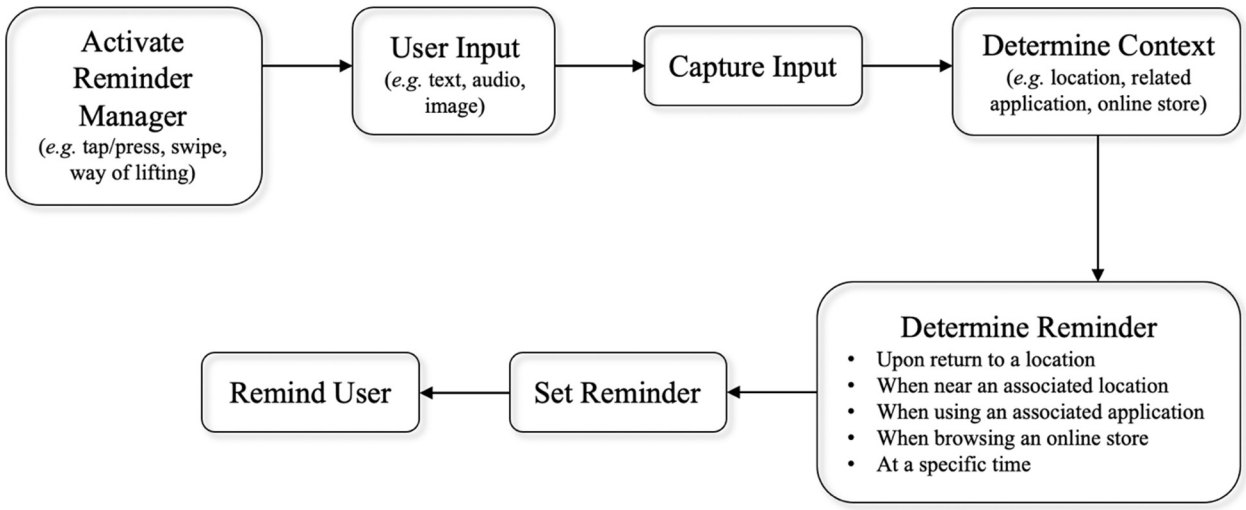

Figure 1

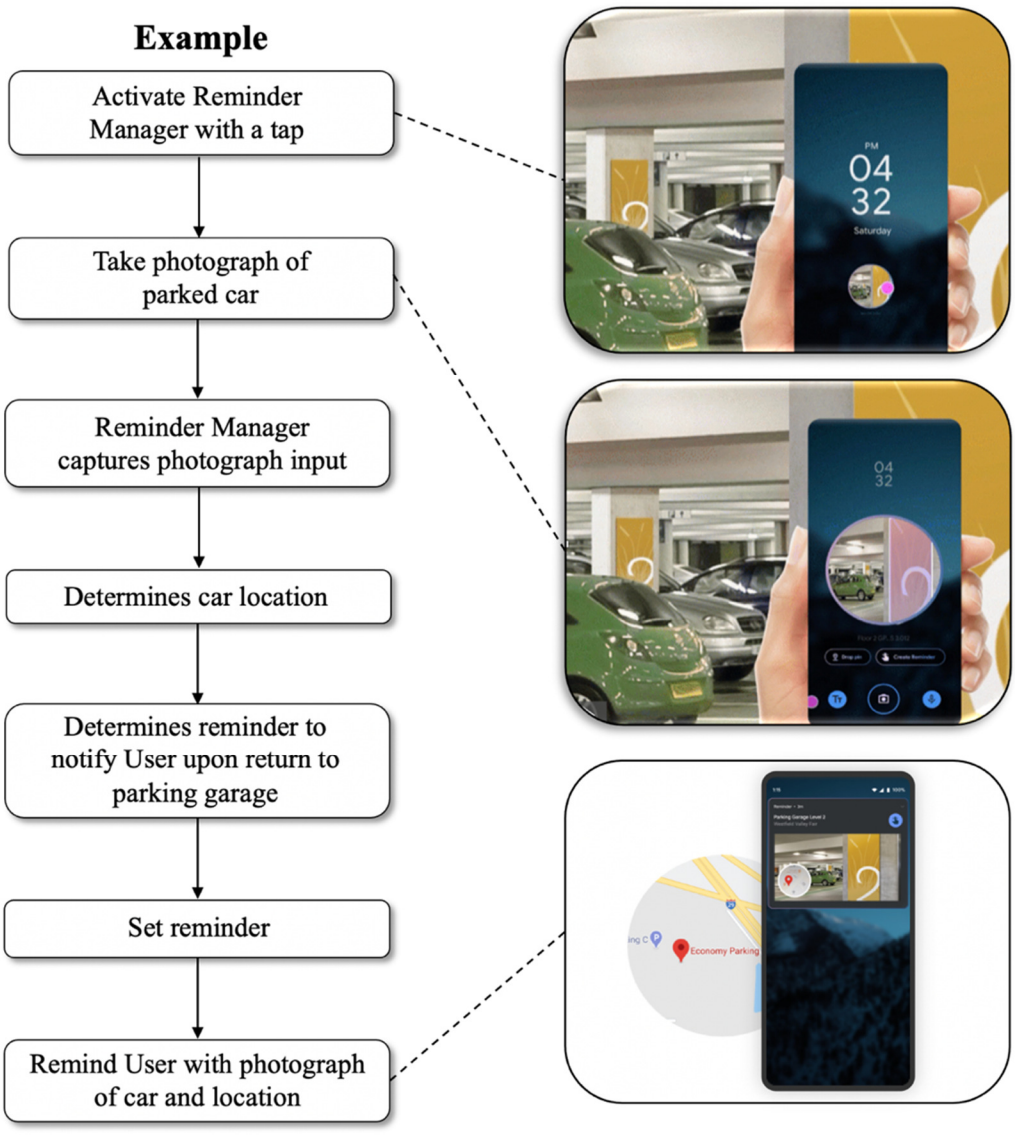

Figure 2

In addition to the user input, the Reminder Manager may further receive associated contextual information on the computing device (*e.g.,* received from a sensor, stored in an associated application, and so forth). In an example, the Reminder Manager may receive location data from a Global Positioning System (GPS) receiver indicating the location of the user. In the example illustrated in Figure 2 (above), the user has taken a photograph of their parked car in a garage and the Reminder Manager has determined from context that the user intends to be

reminded of the location of the car at a later time. The Reminder Manager receives GPS data from the computing device and records the location of the car. When the user returns to the garage, the user will be reminded of the GPS location along with the original photograph input.

A user of the Reminder Manager and/or computing device may be provided with controls allowing the user to make an election as to both if and when the techniques described herein may enable collection of user information (*e.g.*, information about the current location of a user, social network, social actions, social activities, profession, photographs taken by the user, audio recordings made by the user, the preferences of a user, and so forth), 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, the identity of a user may be treated so that no personally identifiable information can be determined for the user, or the geographic location of a user may be generalized where location information is obtained (*e.g.*, to a city, ZIP code, 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.

Once the computing device receives the user input, the Reminder Manager may utilize a machine-learned (ML) model implemented on the CRM of the computing device, using semantic contextual understanding. The operation of the ML model may, for example, classify the user input and determine contextual information to associate with the input and/or predict a desired notification. There are several possible notifications and the ML model will determine the most suitable reminder.

In a first example illustrated in Figure 2, the Reminder Manager may remind the user by showing the captured image when returning to the same location. In this example, the user takes

a photograph of their parked car in a garage with their computing device. The Reminder Manager determines the context of the image and records the location of the vehicle. Upon returning to the garage, the Reminder Manager will notify the user of the location of the car along with the originally captured image of the parked car.

In a second example, the Reminder Manager may remind the user when in close proximity to a location associated with the input context. If the user runs out of milk, they may take a photograph of the empty carton with the camera of their computing device. The Reminder Manager will receive the photograph and determine the object is a carton of milk. The ML model utilized by the Reminder Manager may then determine that the user intends to buy more milk at a convenient time. The ML model may further determine that the user would like to be reminded of buying milk when in close proximity to a grocery store. The Reminder Manager can use associated contextual information, in this example GPS, to remind the user when close to a grocery store by prompting the user with the input photograph of the carton of milk.

In a third example, the Reminder Manager may remind the user when an associated computing device application is open on the user interface. If the user receives a business card and would like to remember the contact, they may first take a photograph of the card. The Reminder Manager may then determine that the user intends to set a reminder to save the information as a contact in their Address Book, the most closely related application installed on the computing device of the user. When the user accesses their Address Book again, the Reminder Manager will prompt the user with the input photograph of the business card.

In a fourth example, the Reminder Manager may remind the user when browsing an online store associated with the input. If the user wants to remember a book to purchase, they may first take a photograph of the front cover with their computing device by accessing the Reminder

Manager on the lock screen. The ML model utilized by the Reminder Manager may determine from context that the user would like to purchase this book. If the user is shopping at an online store that has the book available for sale, a notification will prompt the user with details on how to purchase it.

In a fifth example, the Reminder Manager may remind the user at a specific time when the input context is associated with a calendar event. If the user inputs audio on to the computing device that states, "Call Mom at 3:00pm," the Reminder Manager may determine that the user would like to be reminded at a specific time, 3:00pm, with the task to "call Mom." At 3:00pm, the user will be prompted with this reminder.

References:

[1] Patent Publication: US20200036746A1. Creating Notes on Lock Screen. Priority Date: December 11, 2015.

[2] Patent Publication: US20150312713A1. Location Based Event Reminder for Mobile Device. Priority Date: October 6, 2004.

[3] Patent Publication: US20140033071A1. Actionable Reminder Entries. Priority Date: June 3, 2011.