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Triggering alarms at dynamic and flexible times based on external factors

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Triggering alarms at dynamic and flexible times based on external factors

ABSTRACT

Users often set alarms to be reminded of events or tasks that occur at specific times. In addition to specifying a time, alarms can be set in the form of a timer that goes off after a specified period. Currently, setting an alarm requires that the user know in advance the specific time or period when the alarm is to go off. This disclosure describes the application of artificial intelligence (AI) techniques for setting alarms on a user's device with the user's permission. Such alarms can be set to go off at a time that can vary dynamically instead of a prespecified fixed time. The time at which the alarm goes off is determined based on various relevant external factors.

KEYWORDS

- Alarm clock
- Reminder
- Timer
- Smart alarm
- Dynamic alarm
- Event alarm
- Weather-based alarm
- Traffic-based alarm
- Virtual assistant
- Smart speaker
- Smart appliance

BACKGROUND

Users often set alarms to be reminded of events or tasks that occur at specific times. While one of the most common uses of an alarm is for being woken up, alarms can also be set to go off a specific times that correspond to specific events, such as the beginning of a TV show, end of cooking time for a dish, etc. In addition to specifying a time, alarms can be set in the form of a timer that goes off after a specified period. Such alarm capabilities are included in most mobile devices, such as smartphones and tablets, as well as home devices such as smart speakers, and are typically also integrated with voice-activated virtual assistant applications provided . Currently, setting an alarm requires that the user know and specify in advance the time or period when the alarm is to go off. As a result, users are unable to set and use the alarm functions effectively in situations that involve tasks without precise start times or intervals. Similarly, users currently cannot set flexible alarms that can effectively handle situations that are dependent on the outcomes of prior events.

DESCRIPTION

This disclosure describes the application of artificial intelligence (AI) techniques to set alarms on a user's device. Such alarms can go off at a time that can vary dynamically instead of a prespecified fixed time. The time at which the alarm goes off is determined based on observations of various relevant external factors, as specified by the user. AI approaches such as relevant heuristics, machine learning, etc. are used to process the observations and determine the time at which the alarm should be triggered.

If the user permits, an AI module is included, e.g., as part of a virtual assistant application or as part of a standalone alarm/timer/clock application, that is usable to set an alarm on a user device, such as a smartphone, tablet, etc. The input to the AI module can include information on various external factors, such as the weather, television programs, content of messages between

the users (as permitted by participants in the message conversation), etc. If the users permit, such information is obtained from the device sensors and/or applications that execute on the device, or obtained via the Internet. Such information is then provided as input to the AI module that uses heuristics and/or machine learning to infer various external factors that are likely relevant to the user's alarm.

For example, a user may set an alarm in order to wake up early to go skiing. In such a case, observed weather conditions, such as temperature, wind, precipitation, etc. are taken into account to determine a time at which the weather is suitable for skiing, and the alarm is set to go off accordingly. Alternatively, or additionally, the alarm time can be determined based on messages between users accessed with permission. For example, if a friend has agreed to pick a user up in the morning without specifying an exact time, the user can specify that the alarm go off a specified amount of time after receiving a message that the friend is on the way. To this end, the AI module accesses messages locally on the user device for this specific purpose, as permitted by the user.

The capabilities for setting dynamic and flexible alarms as described above can cover a number of situations encountered in everyday life. For instance, users can set alarms based on dependencies between events such that an alarm goes off when a prior event ends. Such an operation can help with variable time events, such as televised sporting events or events that a user participates in, where prior events (e.g., prior scheduled matches) influence when subsequent events start. Similarly, alarms can be set such that the times at which alarms are triggered are dynamically updated based on monitoring ongoing external factors, such as traffic, public transport status, etc. For example, if unusual traffic and/or public transportation delays are

likely to cause a user's commute to be longer than usual, the user's wake-up alarm can be triggered earlier to ensure that the user reaches work on time.

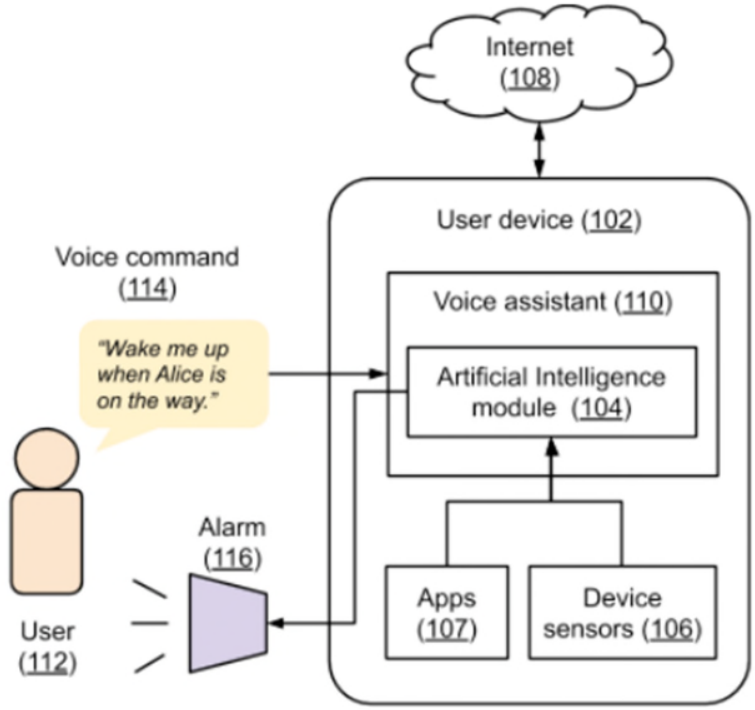

Fig. 1: Dynamic wake up alarm

Fig. 1 illustrates an example of providing a dynamic wake up alarm per the described techniques. A user (112) issues a voice command (114) to a voice assistant (110) provided on a user device (102). The command specifies that the user would likely to be woken up when another user Alice is on the way to pick up the user. The voice command is analyzed by an AI module (104) running on the user device, as part of the voice assistant, an alarm clock application, or other application executing on the user device. Alternative to voice commands, user input can be provided by text commands, menu selections, or other input techniques.

With the user's permission, the AI module is provided with input about external factors from a variety of information sources: device sensors (106), apps on the device (107), and/or the Internet (108). The constraints and parameters specified in the user's voice command coupled

with information from the external sources are processed via prespecified heuristics and thresholds and/or machine learning. The output of the AI module is a time at which the alarm (116) is set off. The external information sources are continually monitored for changes and triggers relevant to the alarm settings and the alarm time is dynamically altered as necessary. Ultimately, the alarm goes off when the conditions desired by the user are met, e.g., when Alice sends a message to the user that she is on the way.

The functionalities described above can be implemented to operate with predefined thresholds that cover a diverse set of factors and activities. For instance, the thresholds for paragliding can be dependent on wind conditions at the location whereas those for surfing can be dependent on wave height. With user permission, the thresholds can further vary based on the user's geographic region. Alternatively, or additionally, the thresholds can be specified and/or adapted by the user. To that end, the user is provided with a custom user interface for specifying the settings in an intuitive manner. For instance, factors dependent on geography and weather can be displayed on a regional map with familiar weather symbols, such as rain, clouds, etc.

The analysis of messaging content, performed locally on the user device with user permission, can employ machine learning models suitable for text understanding. For example, a user can set an alarm by specifying: "Wake me up 10 minutes after getting message from Alice which says: driving now." where the number of minutes and the content of the message are parameters that can be set by the user. Moreover, the content of the message can be a semantic match rather than a literal match, e.g., the messages "I'm on my way," "See you in 30 minutes," etc. are interpreted similar to "driving now."

The techniques described in this disclosure can be extended such that additional external observable factors can be included when setting alarms such that a larger number of use cases

can be supported. To that end, the system can be implemented to support an on-device and/or cloud Application Programming Interface (API) open to third parties that wish to set alarms based on events of relevance to them. For instance, such an extension can be used to integrate with airline status information such that alarms can be triggered based on flight status. In such a case, a user can rely on the airline to provide flight information such that the alarm is triggered taking into account any flight delays or cancelations.

The described capabilities can be provided via an on-device and/or external voice assistant such that a user can request dynamic and flexible alarms using voice. The voice command is processed by the voice assistant to determine the various constraints and parameters related to the alarm. The constraints and parameters are then provided as input to the AI module to set the alarm for the appropriate time.

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 describes the application of AI techniques to set alarms on a user device. Such alarms can go off at a time that can vary dynamically instead of a prespecified fixed time. The time at which the alarm goes off is determined based on observations of various user-permitted factors such as weather information, television schedules, transportation information, content of messages between the users (when permitted by the user), etc. Such information is provided to an AI module that uses heuristics and/or machine learning to infer external circumstances that are relevant to the alarm. The dynamic and flexible alarms can cover a number of situations encountered in everyday life. The described capabilities can be integrated with an on-device and/or external voice assistant such that a user can request dynamic and flexible alarms using voice.

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