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November 01, 2018

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Recommended Citation

Carbune, Victor and Damian, Alexandru, "Notifications for switching attention to ongoing real-world tasks", Technical Disclosure Commons, (November 01, 2018)
https://www.tdcommons.org/dpubs_series/1624

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Notifications for switching attention to ongoing real-world tasks

ABSTRACT

Oftentimes, use of a device results in a change user focus from a real-world activity to the device screen. In many cases, such an attention shift has a negative impact on the user and the ongoing real-world task. This disclosure describes application of a trained machine learning model to detect when the user's attention to an ongoing real-world task is diminished due to device use. When such a switch is detected, a special assistive operating mode is activated for the device. The mode enables mechanisms aimed at helping the user stay informed of the ongoing real-world task and notifying them when it might be necessary to switch attention. The techniques are implemented upon specific user permission and can be turned off by the user at any time.

KEYWORDS

- User focus
- Attention switch
- Notification
- Assistive mode
- Personal Digital Assistant
- Real-world tasks
- Multitasking
- Machine learning model

BACKGROUND

Oftentimes users start using their devices, such as smartphones or tablets, while in the middle of another real-world activity, such as a meeting. Such device use results in a change in

the focus of the user's attention from the real-world activity to the information displayed on the device screen. In many cases, such a shift in attention can have a negative impact on the user and the ongoing real-world task. For example, the user may be deemed rude or irresponsible if detected to be inattentive to the ongoing conversation in the meeting. Moreover, owing to the lack of focus, the user may miss important information regarding the real-world activity.

DESCRIPTION

This disclosure describes a solution to detect when the user's focus of attention switches from a real-world task to the content on the screen of a device, such as a smartphone or tablet. The solution is implemented upon specific user permission and utilizes only such data as permitted by the user. The user is provided with options to turn the solution off at any time. A trained machine learning model running on the user's device is utilized to detect switches in the user's focus when the user's attention to the ongoing real-world task is diminished. With the user's permission, the user's context as measured via the various device sensors as well as relevant metadata provided by the device operating system (OS) are utilized as input by the model to determine when an attention switch occurs.

When a user is deemed to have switched attention from an ongoing real-world task to a task on the device, a special assistive operating mode is activated by the OS or the platform. The applications running on the OS or platform are notified of activation of the mode, indicating that the user is paying diminished attention to an ongoing real-world task while the mode is activated. The mode enables mechanisms aimed at helping the user stay informed of the ongoing real-world task and notifying them when it is necessary to switch their attention from the device back to the real-world task. Assuming the existence of such a mode, a system-level interface can be

provide for first and third party applications to be able to act. A few examples are illustrated below.

For example, the assistive mode is automatically activated if the model detects that the user is less attentive during a meeting as a result of simultaneously checking messages on the phone. While the mode is active, device sensor readings (as permitted by the user) are utilized to monitor the meeting discussion. The user is then kept informed of the meeting conversation via unobtrusive ambient on-screen notification. When the user's active attention and engagement in the meeting is needed, the user is notified of the need to switch focus back to the meeting. Due to being kept updated on the meeting conversation during the period of diminished attention, the user may be able to resume participation in the meeting with minimal time and effort needed to get back to the meeting context. When the machine learning model detects that the user's attention has switched back to the real-world task, the special assistive mode is deactivated.

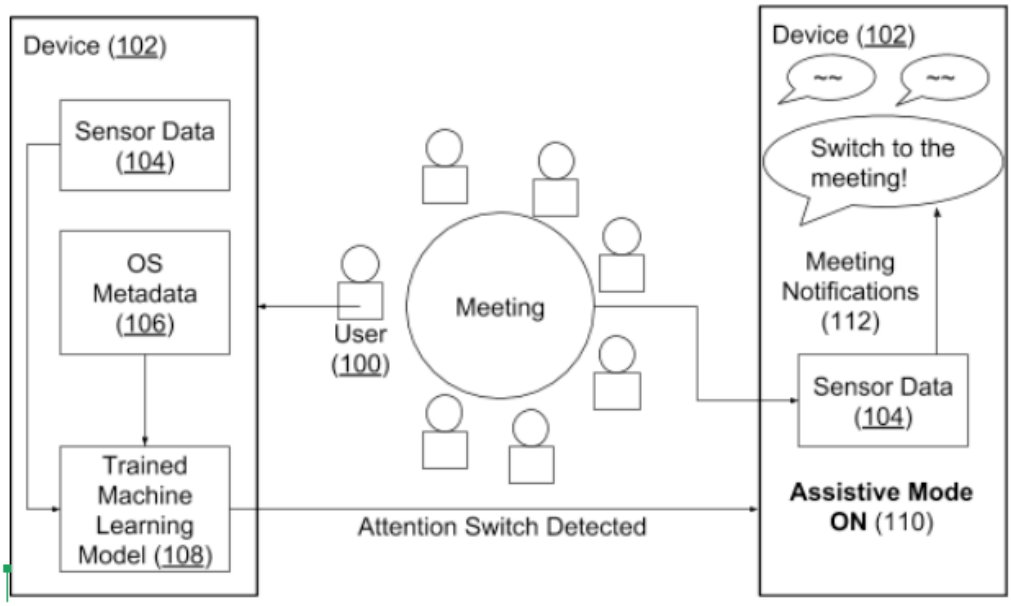

Fig. 1: Using a machine learning model to notify the user to pay attention to real-world tasks

Fig. 1 shows a user (100) working on a device (102) during an ongoing real-world meeting. With the user's permission, the user's context as detected via the device sensors (104) and OS metadata (106) is utilized by the trained machine learning model (108) running on the device. The model detects the attention switch from the meeting to the device, thus activating the special assistive mode (110) on the device. While in the special assistive mode, device sensors are used with the user's permission to monitor the meeting discussion. The user is kept informed of the monitored discussion via unobtrusive on-screen notifications (112). When the meeting discussion indicates that the user's active participation in the meeting is needed, a notification requesting the user to switch to the meeting (e.g., "Switch to the meeting!") is displayed.

The machine learning model may be trained via labeled data generated synthetically for such training. Alternatively, or in addition, real-world data provided by users for model training purposes can also be utilized for training. The model can also handle attention switches between different applications on the device. For instance, when a user is multitasking among different applications, the special assistive mode is utilized to keep the user informed of relevant activity in background applications and request an attention switch to another application at relevant times. The model is augmented by incorporating relevant heuristics as a complementary technique to detect attention switches.

The techniques of this disclosure provide an OS or platform-level mechanism to manage user attention and alert the user when an attention switch is important. For instance, the techniques can be implemented in an agent-based assistive platform or virtual assistant that supports everyday tasks. The specific manner in which the mechanisms are implemented to monitor background tasks and notify users can be varied to suit the particular details of the real-world tasks and the applications. Further, if the user permits, the user's context detected via the

device sensors as well as logs of user interactions with the OS and applications can be incorporated to personalize the mechanisms and corresponding notifications to support a user's unique needs, practices, and preferences, such as tolerance for attention switches and corresponding notifications.

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 application of a trained machine learning model to detect when a user's attention to an ongoing real-world task is diminished due to device use. With the user's permission, the user's context as measured via the device sensors as well as relevant metadata provided by the device is utilized as input by the model to determine when an attention switch occurs. When such a switch is detected, a special assistive operating mode is activated on the device. The mode enables mechanisms that helps the user stay informed of the ongoing real-world task and notifying the user when it is necessary to switch attention back to it. The model

may be extended to deal with attention switches between different applications on the device. The techniques of this disclosure provide an OS or platform-level mechanism to manage user attention and alert the user when an attention switch is important. The specific manner in which the mechanisms are implemented to monitor background tasks and notify the user may vary to suit the particular details of the real-world tasks and the applications.