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User interface for adaptive and contextual presentation of tasks

Steffen Meschkat

Andrews-junior Kimbembe

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ABSTRACT

This disclosure describes techniques for the adaptive presentation of tasks on user interfaces. With user permission and express consent, information regarding user interaction with different tasks on a computing device is obtained along with context information. Machine learning techniques are utilized to determine the likelihood of a specific task to be activated in the current context, e.g., based on the similarity of the current context to the set of past contexts when the task was active. The current context and the set of previously active contexts constitute a set of input features for the machine learning model, and the probability that a task is active in the current context constitutes an output label from the machine learning model. The prominence of displayed tasks on the user interface is adjusted based on user context. Tasks that are likely to be of interest of the user in a current context are displayed more prominently.

KEYWORDS

- Contextual interface
- Task interface
- Adaptive interface
- Task context
- Machine learning
- Operating system

BACKGROUND

Mobile computing devices are used for a variety of tasks and in many different contexts, e.g., specific locations such as home, commute, work, etc. and at different times of the day. While a particular task may not be completely confined to a specific context, some tasks are

more likely in certain contexts. For example, watching videos is commonly more prevalent in home contexts, and perhaps during a commute, but less prevalent in work contexts and in meeting rooms. In another example, the use of a computing device to make a slide presentation is common in a meeting room context, but less so at a work desk. Composing email is prevalent in multiple contexts.

Many devices present users with a view of ongoing and potential tasks via a user interface. Task presentation is an important component for the usability of a personal computing device. Task presentation that is influenced by a current context, e.g., such that tasks that are more prevalent in the current context are given more prominence in the display, can provide an improved user experience. Predefined mapping of tasks to contexts poses a challenge given the large variation across users, organizations, cultures, and variations over time. Additionally, multiple mappings of tasks to contexts may exist which poses additional challenges.

DESCRIPTION

This disclosure describes techniques for the adaptive presentation of tasks on user interfaces. The prominence of displayed tasks on the user interface is adjusted based on user context. Tasks that are likely to be of interest of the user in a current context are displayed more prominently. The techniques are implemented with user permission to access data to determine the device context.

With user permission and express consent, information regarding user interaction with different tasks on a computing device is obtained along with context information. The context information can include elements such as a current time of day, a current day of the week, current location, weather, applications that are being executed on the device, types of data

utilized by running application(s), specific data elements, etc. Only such data as permitted by the user for context determination are utilized. User data for past contexts is stored and accessed if such storage is permitted by the user. If the user denies permission, no user data is accessed and the user interface is switched to a default mode that does not utilize context information.

Machine learning techniques are utilized to determine the likelihood of a specific task to be performed in the current context, based on the similarity of the current context to the set of past contexts when the task was active.

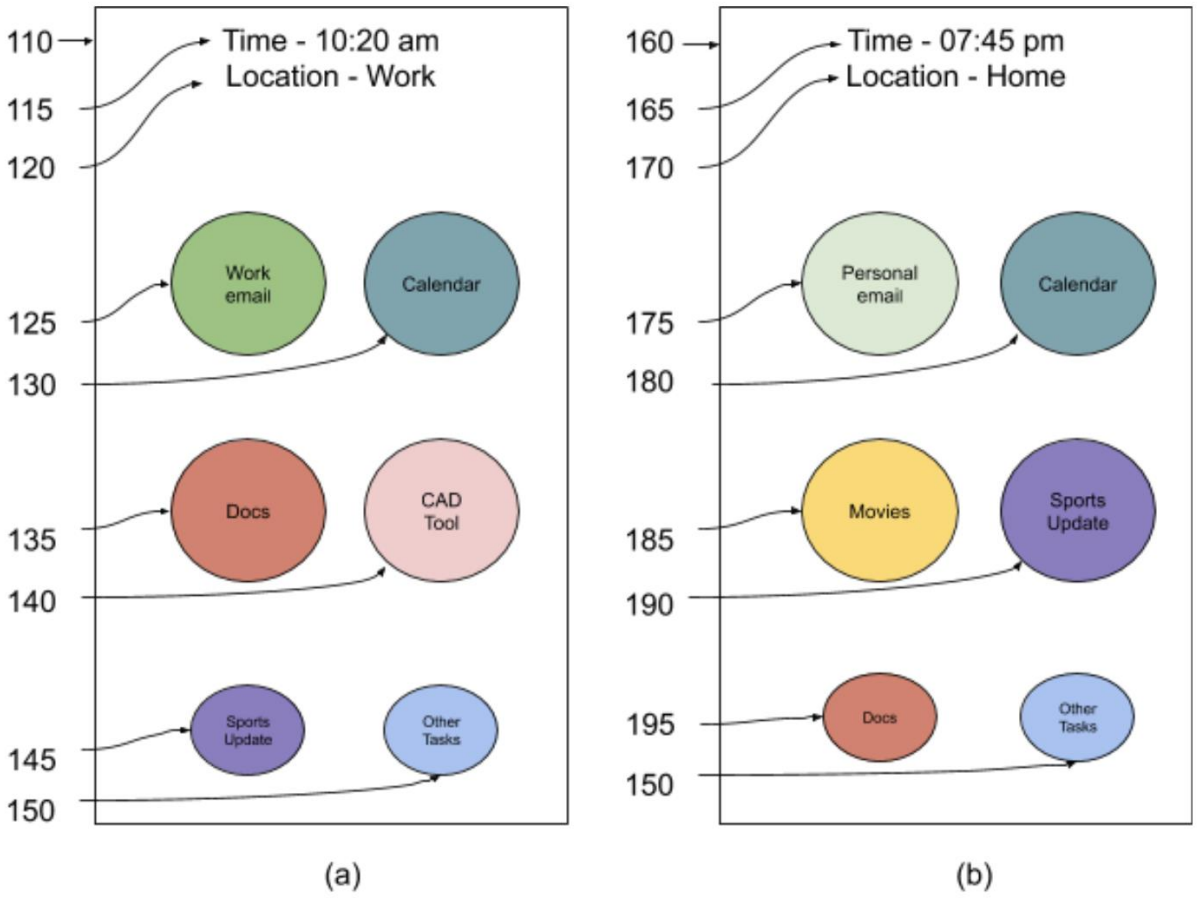

Fig. 1: Tasks likely to be of interest to a user are prominently displayed in a user interface

Fig. 1 illustrates context dependent presentation of tasks on a user interface, per techniques of this disclosure. Fig. 1(a) illustrates an example user interface (110) when a user is

at their workplace (120) during the day (115). With user permission and express consent, user context information such as the location and time are used in conjunction with previous user interactions to infer and identify tasks of likely interest to the user based on the current context and are presented prominently (125, 130, 135, 140) on the user interface while tasks that are identified as being less likely of interest are displayed less prominently (145). The user is also provided with an option to access other tasks (150) from the set of tasks available to the user.

Fig. 1(b) illustrates an example user interface (160) when the user is at home (170), later in the evening (165). Tasks that are likely to be of interest to the user based on the updated context are presented prominently (175, 180, 185, 190) on the user interface while tasks that are identified as being less likely of interest are displayed less prominently (195).

Per techniques of this disclosure, context can include user-permitted factors from the environment and from running applications. After initial setup, when user provides permission, tasks performed by a user and the corresponding context information are obtained and used for determination of task and context relationships.

Machine learning techniques are utilized to determine a pertinence of a task in the current context. The current context and the set of previously active contexts constitute a set of input features for a machine learning model. The machine learning model provides as output the probability that a task is relevant in the current context.

The techniques are operational without a predefined set of different contexts or a predefined set of parameters whose values define a context. The pertinence of a task is thus positively influenced by the similarity of the current context to past contexts in which the task was active, and negatively influenced by the similarity between past contexts in which this task was not active.

Clustering algorithms are utilized wherein the data (log) of observed pairs of (context, task) are grouped into clusters, and tasks appearing in a particular cluster used as labels for that cluster. Further, after adjustment of the user interface to deemphasize tasks determined to be not currently pertinent, sets of other contexts can be utilized to provide users access to the tasks not currently emphasized.

For example, upon detection that the user is in the home context, the user interface includes emphasized tasks that are determined likely to be pertinent to the user in the home context. Additionally, the user interface can also include a task view that provides easy access to tasks that have been determined to be pertinent in a work context. The user can use this task view, even while at home, to glance at tasks left unfinished at work.

Further to the descriptions above, a user is provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein 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. For example, users are provided with controls that enable selection of specific factors that can or cannot be utilized to determine the user's context. In addition, certain data is 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 is treated so that no personally identifiable information can be determined for the user, or a user's geographic location is 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 has 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 techniques for the adaptive presentation of tasks on user interfaces. With user permission and express consent, information regarding user interaction with different tasks on a computing device is obtained along with context information. Machine learning techniques are utilized to determine the likelihood of a specific task to be activated in the current context, e.g., based on the similarity of the current context to the set of past contexts when the task was active. The current context and the set of previously active contexts constitute a set of input features for the machine learning model, and the probability that a task is active in the current context constitutes an output label from the machine learning model. The prominence of displayed tasks on the user interface is adjusted based on user context. Tasks that are likely to be of interest of the user in a current context are displayed more prominently.