An Approach of Visualizing Objects Overlapping for Assisting User Cognition

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Abstract: An approach is introduced for assisting users on selecting the displayed multiple objects on their screen. This approach is related to have a useful GUI by dynamic configurable visualization of overlapping displayed objects provide by the user for executing a certain tasks. Our proposed GUI is associated with metaphor of finding a book of related task from the piled up books of similar tasks with different precision. In order to distinguish the purpose and subject of all displayed objects, we have proposed a layer ordering and related parametric variables assigned to these objects, aligned with user’s action. The framework proposal is presented in horizontal framework metaphor that is all objects collected and participating in user transaction are seen by the user in horizontal manner, as things layout on a table in flattening fashion, (not overlapped or hidden). We think that such approach can enhance and accelerate the user workflow in comparison to conventional style.

Key-Words: overlapping, multiple object, index lists, layer, GUI, user’s behavior, situation

1 Introduction

As internet and IT technologies are providing many resources to users to solve problems by navigating through different files. User open many files and objects on their screen to manipulate them to execute a certain tasks or edit a document related to these different knowledge among these collected from these different windows. User may lose his/her way when a certain interruption or else obscures the user work. The connectivity among these overlapped objects would be loosen (weaken) that would have a certain impact on user to strengthen this connectivity back.

We need to provide a mechanism that makes the user always engaged to all objects on the workspace, (screen) in active fashion to have these windows participation in transitioning user work. We have defined a conceptual framework for designing an interaction based interface that can estimate user workflow using several parametric views related to user situation or else reflecting the user profiling aspects. The user profiles several parametric status (mental state, user age, gender rank and else) as those participate in the style user utilizing (manipulate) these object. This is needed to estimate the suitable or friendly systematic components that ensemble the interaction scenarios, fitting with a specific situation at hand. The situation evolvement can be reflected into another derivation of additional component resembling articulated type of user interface. Such sort of component articulation evolvement is functional of user situation for best performance in executing simultaneous overlapped object on same task force screen.

Visualization is useful to support of user spontaneous performance to interact with the constructed component. The design of these visualized icons, or objects are applying the suitable object reflecting optimal observation of the user.

Many application program objects are displayed planar on the computer screen. Therefore the multiple application objects in the limited screen resource are overlapped by each object. In this limited screen resource environment, an approach for easy controlling multiple objects was proposed by authors [1]. The above approach assists the user to optimize the layout of multiple objects on the screen and to cognize its layout change functions by using the control-icon that uses images of a push-pin and its shadow.

In this paper, we propose an approach for assisting multiple object handling of user with visualizing the overlapping of application objects by switching view point from planar screen. This is to enhance usability and also is,
to have user awareness on his/her workspace. As user has many widows opened on the desktop all the same time. User may lose tack on his windows related to several transactions that correlated to his job. We would like to establish connectivity related to the task work such that correlated windows are bubbling around guiding the user while transitioning his work.

2  Issue of Displaying Multiple Objects
2.1 Overlapping each object
When a lot of object and large size object is displayed on the screen, the contents of these displayed objects are concealed by last active object or each object. It becomes complex to find a target object from a lot of backward objects because the information for the decision of the target object is decreased by overlapping the other objects, that would scattered the user thinking by searching the window that he just referenced few minutes ago while doing a work on another window. We need to establish a control mechanism that makes the utilization of the spatial space for the best performance of the user workflow. This can be achieved by having the windows pop-up is a function of the work flow among these windows sharing that space. This is to have the user working environment has a supportive situation tat is directed by the style of user work.

We need to provide a supportive reasoning mechanism that can be added trough a logical reasoning on the windows connectivity (relationship) as function of the workflow. The workflow is changing with the progress of user work. The work flow would create a precedence map that would support the user to dynamically predict (estimate) or allocate the window that is to used to by the user momentarily.

Computer users usually select a concealed object by reading the minimized related icon, program name or file name in a taskbar. There is a possibility of selecting a wrong target object if so many objects are displayed or target objects for using are not single or similar information are displayed on the taskbar.

2.2 Delay of interrupted operation restarting
The object displaying is multiplexed by starting new task with running resident application program such as mailer software or by cross-referring multiple objects. A user can keep memorizing which is target object and where the each object is while the multiple objects are used actively.

In the office work, user’s continuous computer operation is often interrupted by other task or own break. The interrupted operation is restarted by reselecting target objects with trusting user’s memory. Since the content of the interrupted operation depends on user’s memory in this situation, the time until recalling previous operation is slow if the interruption time is long. When the previous operation is forgotten, user needs to check to all displayed objects.

3  Our Approach
There is an approach for cutting seeking time that is using a photograph metaphor to provide intuitive accessibility in multiple tasks [2]. As this approach uses reduced-size photo of displayed object’s screen, the metaphor can assist intuitively to recall the content of target object for user. However, if number of desired target object is not single, user should check all tasks.

In order to reduce the checking work for selecting desired target object, an approach that overlapping all objects are listed at a glance is proposed in this paper. This idea applies an intuition that is to find a book from the piled up books.

3.1 Indexing user’s operation by each object
The parameters of displayed multiple objects on the screen are stored to the temporal database as index list for giving information to the user. In order to distinguish each application object, layer order number, object name of file or program, active past time, file size and count of selected target object as shown Table 1 is stored to the index list.

In the Table 1, value of the “Sort No” means actual layer orders of the displayed multiple objects. When an object is displayed to most front side on the screen, the value of “Sort No” is 1 then. If the displayed object is not editor or viewer of data file, the value of “Size” is stored to the index lists as “-”.

The “Sort No” of the index list are updated every activating displayed object. The “Count” of the index list is also increment by selected target object. In addition, the value of “Time” in the index list keeps increasing while the target object is selected.
### 3.2 Proposed Visualization

Fig. 1 shows the layers of all displayed objects. The indicated list of the objects has similar information to the taskbar and the list is added layer information. The upward portion of the layer list in Fig. 1 means near by front side of the screen. Therefore, the used objects of recent time are collected to upward.

In order to assist for user’s selecting, file name or program name and related icons are displayed. The listed item of the object with large size data file thickens as additional information that based on the index list in Table 1. Furthermore, these listed layers of all displayed objects are colored as the elapsed time of operating a target object.

With the longest elapsed time of displayed object as the base, the listed layers of the displayed objects are colored from the left side by each elapsed time. Therefore, the user can know at a glance which object how long was used. The color of the elapsed time is normally dark and translucent color. For distinguishing additional information, the elapsed time bar of the most selected application program object is displayed light and translucent color. The effect of this contrast is that user can know which object is frequently-used at self unconscious behavior.

By using the above interface, user can prevent the wrong selection in similar application objects because the display of the listed objects is different due to user’s behavior.

In addition, the interrupted operation can be restarted quickly as indicating priorities of the main object at a glance that are how long use and how many use.

### 3.3 Implementation idea as tool

Fig. 2 shows proposed GUI that is for coexisting with conventional selecting method of the multiple objects. The above proposed visualization in Fig. 1 is always displayed to front side of the screen. Usually the size of the proposed layer list is minimized and positioned to desired position on the screen. The proposed layer list can move by dragging.

When the proposed layer list is clicked with the minimizing its size, the list is maximized such as occupy the majority of the screen. This maximized layer list is translucent and observable existing displayed objects. If the item of the maximized layer list is selected, the related target object of selected item is activated and the order of the layer list is refreshed. After selecting the item of the layer list, the size of layer list is shrank to minimized size.

### Table 1: Example of storing user’s operation and parameter of the displayed objects

<table>
<thead>
<tr>
<th>Sort No</th>
<th>Name</th>
<th>Time (sec)</th>
<th>Size (KB)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>1800</td>
<td>5000</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>1300</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>450</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>1400</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>700</td>
<td>3000</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>1000</td>
<td>-</td>
<td>9</td>
</tr>
</tbody>
</table>
4 Conclusion

The visualization for preventing the miss selection of the target object and smoothly restarting the interrupted operation by listing overlapping of displayed objects at a glance is proposed in this paper. The important component for effectively utilizing the proposed GUI is to record the user’s behavior according to situation.

The proposed GUI is one of approach for assisting appropriate next action to user. This assistance requires many components on user situation for indicating accurate desired action of user. The behavior of user is changed by the situation that likes various psychology or emotion. The cognition of user is also different by country, age, job, culture, creed, and etc.

Extending number of decision what behavior is needed for giving user further interactive computer operation is an issue in this study.

References: