Password Input Interface Suitable for Primary School Children

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Abstract

Nowadays, Japanese children in primary schools are using computers that aren’t designed specifically for them, so their current environment isn’t appropriate for their initial use of computers. The same is true for start up authentication systems. That is, since under the current system users have to input their names and passwords of alphanumeric characters from a keyboard to obtain certification, the system appears too difficult for Japanese primary school children who haven’t yet learned the Roman alphabet. Therefore, in this study, a new password input interface was designed using icons with symbols familiar to primary school children, and then the system was evaluated by varying parameters such as numbers of icons and icon selection time and frequency. As a result, this study proposes a new password input interface suitable for primary school children.

1. Introduction

In recent years, computerization has been progressing quickly in schools. In Japan, the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Public Management, Home, Affairs, Posts and Telecommunications pushing forward the introduction of computers and network environments to schools in order to enrich information education.

The computers and network environments in Japanese schools are being improved. However, the present environment is not adequate for children. The main reason is that it is not an established individual environment. User authentication is required in order to establish an individual environment. When a student logs on to the networks, she/he types her/his account and encrypted password on a keyboard. However, not all primary children know the alphabet. This was the focus of this study.

2. Design of Password Input Interface

2.1. Investigation of icon discernment

First, we investigated the discernment of icons by primary school children. The subjects were 31 Japanese first graders. We prepared 10 categories of icons, fruits, flowers, colors, carriages, insects, animals, symbols, vegetables and necessary goods. A total number of 129 icons were prepared. The subjects looked at these icons on the computer screen. Then, they had to describe the icons on paper. Consequently, 65 kinds of icons that they can discriminate were extracted. Icons with a discernment of 100% were strawberry, mandarin orange, banana, melon, watermelon, Japanese persimmon, apple, patrol car, airplane, bike, bicycle, red, aqua, yellow, rabbit, cattle, giraffe, cat, carrot, frog, turtle, cicada, ant, desk, chair, triangle, rectangle, heart, daystar, rain.

2.2. Design of Password Input Interface

Most primary school children could operate a mouse, so we designed a mouse based password input interface. Figure 1 shows the designed interface. The icons are 32 pixels square and each interval was half size the size of an icon. The icons were arranged at random. Whenever an icon is chosen, it is arranged at random. Thereby, a password cannot be distinguished by others from the position of an icon. The interface has three buttons. A push on the determination button means password input is complete. A push on the clear button means clearing an old input. If the back
Figure 1. Overview of Designed Interface

button is pushed, input in the previous icon can be repeated. A user name registered beforehand can be chosen from the pulldown login name list. The message indicator shows the user the success or failure of the login. The state indicator shows the input situation of an icon used in the present password.

3. Evaluation

Evaluation was conducted using the proposed interface. Three types of interfaces with different numbers of icons and the number times of selection of an icon were used for evaluation. Table 1 shows the results for each interface. The input time and correctness of each interface were compared.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Display Icons</th>
<th>Number of Selection Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-I</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Type-II</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Type-III</td>
<td>64</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2 shows the frequency of correct input. Although all the patterns of a password could be memorized, many mistakes in input order were identified. Almost all subjects had memorized their passwords.

<table>
<thead>
<tr>
<th>Type</th>
<th>Total Input</th>
<th>Correct Input</th>
<th>Error Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Input Mistake</td>
</tr>
<tr>
<td>Type-I</td>
<td>45</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Type-II</td>
<td>55</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>Type-III</td>
<td>50</td>
<td>45</td>
<td>1</td>
</tr>
</tbody>
</table>

4. Conclusion

This paper describes a new password input interface using icons familiar to primary school children, and its evaluation by varying parameters such as numbers of icons and selection time for each icon. It was found that the quickest interface type is Type-II.

In future work, the number of icon displays and the input times of icons will be evaluated in more detail.

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References

