ABSTRACT

Authentication is the first step of security to avoid unauthorized access to the resources. The knowledge based authentication techniques are widely used for user authentication because they are easy to understand, simple to implement and no additional devices are required for authenticating users. Traditional methods use textual passwords for authentication. Users tend to select predictable textual passwords due to human memory limitations. Hence, in practice, security of passwords depends on the memorable password space which is a small subset of the total password space. The textual passwords are vulnerable to the password guessing and the password capturing attacks.

Many cognitive studies proved that humans have superior performance in remembering the pictures than text. Based on this concept, graphical passwords were introduced as alternative to textual passwords to handle the drawbacks of textual passwords. Graphical passwords allow users to remember pictures/images instead of text which helps them to remember the passwords easily. Graphical passwords are divided into three categories – recognition based, recall based and cued recall, based on the cognitive task involved in retrieving the passwords from memory.

The recall based techniques have large password space, but the security depends on the length of the password, number of strokes and the sequence of strokes in the password. For random shape passwords with multiple strokes, it is difficult to remember the order of strokes. In this thesis, a recall based native language password authentication technique is proposed to increase the memorability of passwords. Users develop their own style of writing the native language characters and this helps to create unique and memorable passwords.
The recall based techniques are vulnerable to password capturing attacks. Generating session passwords by mapping of the shape of the native language character to text in a dynamic login grid is proposed to make the native language password authentication technique strong against password capturing attacks.

The existing recognition based techniques are good in memorability, but in security aspect, these techniques are comparable to 4 digit PIN only. A recognition based authentication technique using a tool is proposed to make the users to remember pictures instead of digits for passwords. An ancient Indian traditional board game popularly known as “Snakes and Ladders” world over is proposed as a tool in this technique. The tool helps to enhance the memorability, security and usability of passwords.

We conduct user studies in the lab to evaluate the memorability and usability of the techniques proposed in this thesis. We analyze the techniques for security and propose a few enhancements to improve the techniques.