ISSN: 2278 – 1323
International Journal of Advanced Research in Computer Engineering & Technology
Volume 1, Issue 4, June 2012

A Proposal of Image Arrangement CAPTCHA

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***Abstract-* A CAPTCHA is a technique that is used to prevent automated programs from being able to acquire free e-mail or online service accounts. However, as many researchers have already reported, conventional CAPTCHAs could be overcome by state-of-the-art malwares since the capabilities of computers are approaching those of humans. Therefore, CAPTCHAs should be based on even more advanced human-cognitive-processing abilities. In addition, it is also important to keep in mind that answering CAPTCHAs is an added annoyance for users, who feel troublesome to prove that they are humans at every Web accesses. So, CAPTCHAs should be enjoyable for users. To cope with these issues, we have focused on the human ability to understand humor which is considered one of the most advanced human cognitive processing abilities, and already proposed the concept of a new type of Turing test that uses image Arrangement , which would make CATPCHAs fun and enjoyable. So in this paper, we carry out experimental studies to confirm the usability of the proposed CAPTCHA.**

Turing Test; CAPTCHA; image Arrangement; humor (key words)

I. INTRODUCTION

Network security involves the authorization of access to data in a network, which is controlled by the network administrator. Users choose or are assigned an ID and password or other authenticating information that allows them access to information and programs within their authority.

Network security covers a variety of computer networks, both public and private, that are used in everyday jobs conducting transactions and communications among businesses, government agencies and individuals. Networks can be private, such as within a company, and others which might be open to public access. Network security is involved in organizations, enterprises, and other types of institutions. The most common and simple way of protecting a network resource is by assigning it a unique name and a corresponding password.

Denial of service (DoS) attacks, such as masses of Web service accounts being illicitly obtained, bulk spam e-mails being sent, and mass spam blogs (splogs) being created, etc., by malicious automated programs (e.g., bots) are becoming a serious problem. Thus, the Turing test is becoming a necessary technique to discriminate humans from malicious automated programs and the Completely Automated Public Turing test to tell Computers and Humans Apart (CAPTCHA). An image recognition-based CAPTCHA such as Asirra(Animal Species image recognition for restricting access) is known as one of the effective solutions to enhance CAPTCHAs, because image recognition is much harder problem for a machine than character recognition. Animal images can be fun and enjoyable by the users. By using animals users feel fun and enjoy them self.

II. RELATED WORKS

ESP-PIX, so called "naming images CAPTCHA", has been proposed in CMU [1]. In ESP-PIX, a user is presented with several distinct images of same subject. Then the user has to correctly type the common term associated with the images.

II.Image Arrangement CAPTCHA :

Concept:

CAPTCHA used to identify whether the web application is using by the Human or Computer .Using the web applications by the user we can provide the security to that web application using the CAPTCHA.In this image based-CAPTCHA image provided to the user. That image divided into 9 pixels. Among the 9 pixels .Now image CAPTCHA consisting of pixels. We can shuffle that pixels after that provided to the user. Pixel is Electronics & Computer Science / Computer Science any of a number of very small picture elements that make up a picture, as on a visual display unit. Pixels are generally arranged in rows and column. In Computer science, the smallest discrete component of an image or picture on a CRT screen.

III.Math

Your probably seen those colorful images with distorted text in them at the bottom of Web registration form. CAPTCHAs are used by Yahoo, Hotmail, PayPal and many other popular Web sites to prevent automated registrations, and they work because no computer program can currently read distorted text as well as humans can.

CAPTCHA is a "completely Automated Public Turing Test to Tell Computer and Human Apart". Public means that the code and the data used by a CAPTCHA should be publicly available. Turing Test means CAPTCHAs are like Turing Tests in that they distinguish humans from computers.

As more and more sites accept comments from their users, more and more people are trying to leave messages telling people how to enlarge their outgoings. Unfortunately, spam makes people rich and there's not all that much we can do apart from block and delete it when it happens to us. CAPTCHAs are at the points of submitting something, or where you would sign up. They are in the places where there is most probably going to be an automated spam attack.

Requiring a set of machine testable, programmatically valid options helps ensure that images have complete structure. If no accessible option can be determined, then the resulting structure should be considered invalid. Text alternatives are essential for accessibility. Enabling automatic valuators to programmatically detect the presence or absence of text alternatives raises public awareness of Web accessibility in general and aids in accessibility education in particular.

Image CAPTCHA saved in database. When User using the wed site or web application that image pixel CAPTCHA can provided to the user. User can rearrange that image pixel

CAPTCHA then user easily log on to that web application.

Otherwise, user cannot log on to that particular website. User may request new CAPTCHA image because user cannot arrange that image CATPCHAs we can provide new image CAPTCHA when user requested other image. From the database immediately, we can provide an image to the requested user. User can try to rearrange that image. User easily logged onto the web application. We can provide security to the web application by using the CAPTCHA.To arranging the image CAPTCHA user can take some time based upon the humar.

For a computer, however, it would be difficult to recognize the meaning of the pictures and utterances in each panel. Moreover, even if image processing and natural language processing capabilities developed to the level where the computer could recognize the meaning of the pictures and utterances, it would be still impossible for the computer to arrange the four panels in the right order unless it understood humor – what is funny about the cartoon, and why? Cartoons often contain situations that do not appear explicitly in conversation, such as tacit understanding and atmosphere. We believe that it would be nearly impossible for malwares to reach a level where they can understand this type of implicit meaning (humor), regardless of how advanced the technology might be.

Furthermore, because reading cartoons is fun and entertaining for humans, a four-panel cartoon CAPTCHA will most likely be seen as an agreeable and enjoyable Turing Test that does not adversely affect convenience for users.

B. Authentication process

The authentication process used in a image arrangement CAPTCHA is as follows:

STEP 1image is selected at random from a database of cartoons.

STEP 2.The order of the panels in the selected image cartoon is rearranged randomly (shuffled).

STEP 3.The shuffled image parts is presented to a webpage visitor.

STEP 4.The visitor rearranges the shuffled image cartoon into what appears to be the correct order. (The webpage could be equipped with a form allowing the visitor to input the correct order of panels.)

STEP 5.If the order of the panels entered is correct, the visitor is identified as a human, and if the order is incorrect, the visitor is identified as a malware.

IV. VERIFICATION EXPERIMENTS

We conducted basic experiments to check and evaluate the feasibility of the proposed method.

A. Goal of the experiments

We conducted a simple preliminary experiment to check whether humans could easily arrange shuffled four-panel cartoons into the correct order. We also investigated how the level of difficulty in this task changed depending on the type of four-panel cartoon.

B. Experimental method

The subjects in this experiment were ten volunteers who were college students (subject A-J). These subjects were presented with shuffled four-panel cartoons, like the one shown in Fig. 7 and were then asked to arrange the panels in the most appropriate order according to the flow of the cartoons.

For the purposes of comparison, the following three types (categories) of four-panel cartoons were used in this experiment.

four-panel cartoons selected at random from among four-panel cartoons published on the Internet (e.g.: Fig. 8)

1) Ten image arrangement with very clear story lines; considered highly likely to be arranged correctly by human subjects

2) Ten four-panel cartoons where if one panel is removed, the order of the remaining three panels is clear, such that those remaining three panels are considered highly likely to be arranged correctly by human subjects

Ten four-panel cartoons in each of categories (i), (ii), and (iii) were presented to the subjects in random order. The subjects were given no information about any of the four-panel cartoons in categories (i), (ii), and (iii)

V. REMARKS

A. Security

In the case of four-panel cartoon CAPTCHAs, a four-panel cartoon is presented with the four panels rearranged randomly, and users that are able to respond with the correct order are identified as humans. In this case, however, since there are only 24 possible combinations, even a malware could respond a correct answer at a rate of one out of every 24 tries. It is therefore necessary to investigate methods for constructing more effective four-panel cartoon CAPTCHAs.

For example, if a panel that is completely unrelated to the four-panel cartoon used for the CAPTCHA is displayed as a decoy, then the success rate for a malware will be reduced by $1/\{_{n+4}P_4\}$ for every n decoy panels included. This also increases the effort required by users, however, and there is a fear that the usability will decrease. We will need to explore the most appropriate configurations for four-panel cartoon CAPTCHAs from the perspectives of both security and usability.At the same time, we plan to conduct detailed studies regarding whether the four-panel cartoon CAPTCHA is true impervious to malware attacks.

B. Operation procedures

A large volume of four-panel cartoon data would be required to put four-panel cartoon CAPTCHAs into actual operation on the Internet. Japan has a highly developed Manga (cartoon) culture, and four-panel cartoons are published in many newspapers every day, providing a rich source of such data. It will be necessary, however, to study mechanisms for accumulating four-panel cartoons in a database. A system will also have to be constructed to automatically create CAPTCHAs from the four-panel cartoons in the database.

In order to accumulate cartoons, it would be possible to incorporate a business model into the proposed CAPTCHA as follows: cartoonists from across the country upload their own four-panel cartoons into the CAPTCHA database, so that each time a given cartoon is used as a CAPTCHA on an Internet page, the cartoon's author would be paid royalties (Fig.11).

In order to implement this system, it will be necessary to find a way of automatically extracting from a vast numbers of

the uploaded cartoons in the database only those cartoons that are easy for humans to understand. Furthermore, when copyrighted cartoons are used, it is necessary to give sufficient consideration to the protection of these contents (e.g.,

preventing the cartoons from being copied by using a screen capture for the CAPTCHA authentication screen).

It is noted here that the above-mentioned cartoon database should be concealed from public and those four-panel cartoons should be stored in private. If the cartoons are publicly stored, attackers can easily collect the answers (i.e., correct order of panels) of four-panel cartoon CAPTCHAs by using the database. One of the practical ways could be to establish an agency which carries out all the operation regarding the proposed CAPTCHAs: (1) when a user visits a Web page, the user is redirected to the agency site, (2) the user is authenticated in the agency site with a four-panel cartoon CAPTCHA, and (3) agency sends the result back to the Web page.

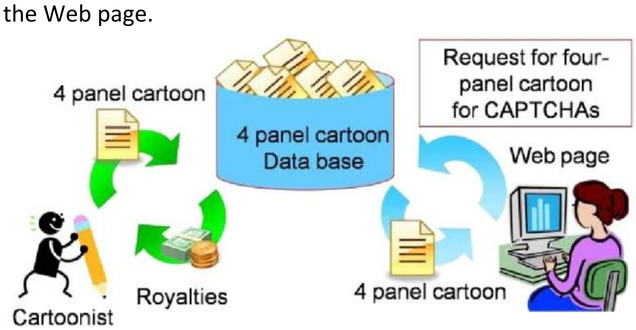

Figure 11. Outline of operations using four-panel cartoon CAPTCHAs

C. Entertaining aspect

Even in the case that we only used well-conceived cartoons (experiments (ii) and (iii) in Section IV), the average response time was about 28.5 seconds, which is substantially longer than the response time for conventional CAPTCHAs using character recognition. Answering CAPTCHAs is an added annoyance for users, who feel troublesome to prove that they are humans at every Web accesses. Reducing the response time for the four-panel cartoon CAPTCHAs is therefore a crucial issue.

If the authentication process itself is a itself is a pleasant one for users, however, it is expected that the overall usability level will be acceptable even if the response time is longer. In the proposed method which is asking the users to read four-panel cartoons, we believe that the authentication process will be entertaining and enjoyable. In other words, despite the fact that the proposed method requires more time for an authentication than conventional CAPTCHAs using character recognition, the level of usability experienced by the user is not expected to decrease significantly. We plan to confirm this assumption through subject interviews.In the proposed method, there is a potential to further increase theentertainment value. For example, cooking recipes presented in the form of four-panel cartoons could be used in place of actual cartoons. A website that introduces cooking information would like to use such a CAPTCHA with a four-panel recipe. In this way, by creating CAPTCHA that are related to the Web page contents, it is possible to draw the user's interest, and to further strengthen the entertainment value of the proposed CAPTCHA value of the proposed CAPTCHA.

IV.CONCLUSION

In this study, we focused on the user's ability to understand humor, which represents the ultimate in human cognitive processing abilities, and proposed a CAPTCHA that uses image pixels. The proposed method is expected to offer a new form of CAPTCHA that feature both security and usability, being difficult for advanced malwares to decipher, and at the same time offering entertainment value for users. This paper confirmed the usability of the proposed CAPTCHA throughout some experimental studies.

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