A Spelling Based CAPTCHA System Using Click

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Abstract— CAPTCHA is Completely Automated Public Turing test to tell Computers and Humans Apart. It’s become a key to prevent malicious programs to access web resources automatically. In this paper, a new type CAPTCHA system will be proposed. The proposed scheme, named Clickspell, combined the features of text-based and image-based CAPTCHAs. Clickspell asks users to spell a randomly chosen word by clicking distorted letters for passing the test. Users can learn the definition(s) of the chosen word. Clickspell can add an advertisement image which in turn increase Security of your system.

Index Terms —CAPTCHA, Optical Character Recognition (OCR), Information Security, Internet Security, Image Processing

I. INTRODUCTION

Now-a-days Internet is most widely used in all daily transactions including daily shopping, education, commerce and industrial sector. All these transactions mainly needs filling of certain registration forms by entering individual information. Only after that the user is allowed to access that website.

But some individuals develop programs which make false registration by filling wrong information and access the website. It leads to the wastage of the web resources. So in this way they try to deny the services used by the regular users. These attacks are called “Denial of services”.

To prevent these attacks various methods have been introduced. To examine the huge and bulky data of registration by humans is impossible so with the help of computer these methods are implemented with the aim to distinguish human users from computers.

To distinguish between human and machine a test known as Turing test is used in which intelligence is provided to computer to make the right judgement. In turing test human and machine are in different rooms and a human judge has to decide who is responding- a machine or human by asking number of questions. CAPTCHA is turing test with a difference that here the judge is a computer.

OCR (Optical Character Recognition) is a program to recognize the text in standard format. But it cannot recognize low quality or distorted characters and pictures. Due to this weakness of OCR a method can be developed in which random pictures of images or distorted words are provided which can only be recognized by humans.

In this paper, we will propose a novel form of CAPTCHA, which is based on spelling by requesting users to click on the mouse rather than press the keyboard. The proposed system, named Clickspell, will show the explanation of the test word by using Google dictionary. When people click the letters of the test word, he/she might learn the meaning of the test word at the same time. Furthermore, the proposed system, Clickspell, can add advertisement easily whenever the services provider needs.

II. PROPOSED SYSTEM: CLICKSPELL

CAPTCHA uses many image processing procedures to defend itself against malicious robots’ attacks. For examples, adding noise, scaling text, or rotating the image and so on. However, the processed results may not be recognized by human if the processed image is distorted too much. In other words, CAPTCHAs may not be recognized hardly by robots, but also difficult for people. In this Section, we will propose a spelling based CAPTCHA system, named Clickspell. The proposed scheme, Clickspell, not only try to improve both security and usability of CAPTCHA, but also aim to expand the applicability of CAPTCHA. Clickspell attempt to achieve the following goals:

1) Security: To resist the attack of malicious programs.

2) Usability: To increase the rate of passing the test.

3) Extensibility: To provide a dictionary function for users to learn about the meaning and the spelling of words. In addition, an advertisement can be placed on the top of CAPTCHA images.

The main idea of Clickspell is randomly choosing a word from the dictionary and asking user to spell it by clicking the letter by letter in order. The letters of the chosen word are properly distorted and randomly located in the CAPTCHA image (Figure 1). In addition, for educational purpose, the meaning of the chosen word will be shown above the CAPTCHA image. User could read the detailed definition and examples of the word by simply clicking the explanation area to pop-up the window. Figure 2 is a pop-up screenshot of the detailed definition and examples of the word ‘STEAM’. Furthermore, Clickspell can easily add a commercial advertisement on it by adding a cover image (advertisement) on the CAPTCHA image. In this case, users have to click the
letters via a moving mask as Figure 2 shown. Thanks to the advertisement image and moving mask, it is harder to attack Clickspell by the malicious robots.

The CAPTCHA image of Clickspell can be divided into four parts: Banner area, explanation area, click area and advertisement image. Each part performs a particular function as follows.

• Banner area: Display a word randomly chosen from the English dictionary. And this word is used for testing users. The users have to spell it by clicking the letter by letter for passing the test.

• Explanation area: Show the meaning of the chosen word in the designated language. This function utilizes Google dictionary. And there are more than 40 different languages that can be used. Users can read the word definition and its examples by clicking the explanation area. Furthermore, to click the sound icon will pronounce the word.

• Click area: All the letters of the testing word are properly distorted and randomly located in the click area. In the click area, a background image is placed under the letters. In order to against the robots’ attack, the background image is generated by drawing lines, dots, polygons with random colors and sizes.

• Advertisement image: Click area can be covered an image and the covered image could be an advertisement. For example, Figure 2, an advertisement image is placed on the top of click area and accompanying added a mask. Users can move the mask to finding the letters.

III. MATHEMATICAL MODEL

A CAPTCHA system forms a CAPTCHA image which provides security to websites.

a. Let S be the Spelling based CAPTCHA using Click

S = {….

b. Identify the input:

S = { I1, I2, I3, I4 ….. }  
I1= { x | ‘x’ be the CAPTCHA code } 
I2= { x | ‘x’ be the background image } 
I3= { x | ‘x’ be the advertisement image } 
I4={x | ‘x’ be meaning fetched from the google dictionary}

c. Identify the output as O:

S = { I1, I2, I3, I4, O, … } 
O = { t | ‘t’ be the generated CAPTCHA system }

d. Identify the processes as P

S = { I1, I2, I3, I4, O, P, … } 
P = { Fc } 
Fc is the interface for CAPTCHA module.

e. In is the set for making CAPTCHA code from characters.

In = { Ip, Pi, Op} 
Ip = { i | ‘i’ is the characters that are placed on background image} 
Pi = { i | ‘i’ is the function to be applied on characters} 
Pi (Ip) = Op 
Op={ol’o’ is the CAPTCHA code}
f. M is the set for matching user entered CAPTCHA co-
ordinates with specified one.
\[ M = \{ M_i, M_p, M_o \} \]
\[ M_i = \{ m | 'm' \text{ is the coordinates clicked by user onto image or position of images} \} \]
\[ M_p = \{ m | 'm' \text{ Matching function that matches users input with specified one in current CAPTCHA} \} \]
\[ M_p (M_i) = M_o \]
\[ M_o = \{ m | 'm' \text{ is a result return by } M_p \} \]
g. Identify failure cases as F
\[ S = \{ I_1, I_2, I_3, I_4, O, P, F, \ldots \} \]
Failure occurs when -
\begin{enumerate}
  \item O= \{Φ\}
  \item O= \{ r \mid 'r' \text{ is the image that is difficult to recognize}\}
  \item O=\{r \mid 'r' \text{ is the event when click event is not activated}\}
  \item O=\{r \mid 'r' \text{ is the event when test passed by malicious programs/robots}\}
\end{enumerate}
h. Identify success cases (terminating case) as C
\[ S = \{ I_1, I_2, I_3, I_4, O, P, F, C \ldots \} \]
Success is defined as -
\begin{enumerate}
  \item O=\{r \mid 'r' \text{ is matching between user input and specified input is done properly}\}
  \item O=\{ r | 'r' \text{ is the image that is easy to recognize by user} \}
  \item O=\{ r | 'r' \text{ is the minimum time required to pass test}\}
  \item O=\{r \mid 'r' \text{ is the event when malicious programs/robots fail to pass test} \}
\end{enumerate}
i. Initial Conditions as So
\[ S = \{ I_1, I_2, I_3, I_4, O, P, F, C, S_o \ldots \} \]
Initial conditions are -
\begin{enumerate}
  \item There should be words in the database.
  \begin{enumerate}
    \item I.e. \( I_n \neq \Phi \)
  \end{enumerate}
  \item There should be coordinates of characters of the word to be dispersed to be stored in database.
  \item There should be advertisement images stored in database.
\end{enumerate}
j. Therefore, Spelling Based CAPTCHA using Click is modeled as
\[ S = \{ I_1, I_2, I_3, I_4, O, P, F, C, S_o \} \]

Table 1. Mathematical Model

<table>
<thead>
<tr>
<th>Description</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fc (I1)=O</td>
<td>Interface applied in order to generate CAPTCHA image randomly.</td>
</tr>
<tr>
<td>I is the set of inputs.</td>
<td></td>
</tr>
<tr>
<td>O is the output CAPTCHA image.</td>
<td></td>
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IV. ADVANTAGES AND DISADVANTAGES OF CAPTCHA

A. Advantages
1. Provides easy interface and increase probability of clearing CAPTCHA in 1st attempt to very high extent.
2. Reduces overhead on server.
3. Provide high security through use of distorted background image and advertisement image.
4. Any language CAPTCHA can be implemented in our system. So it is beneficial for people who don’t know English.
5. Website can earn profit by putting adds on CAPTCHA Panel.

B. Disadvantages
1. Blind people can’t handle these CAPTCHAs.

V. CONCLUSION

A new type CAPTCHA system, Clickspell, has been proposed in this paper. To pass the Clickspell test, users have to spell a randomly chosen word by clicking on distorted letters. Clickspell derived the main feature of text-based CAPTCHA, i.e., easy to use. Furthermore, Clickspell retains the character of image-based CAPTCHA, i.e. recognize objects from an image. Clickspell provides the dictionary function for users to learn the definition(s) of the spelling words. Furthermore, Clickspell can add an advertisement image optionally. Because of the advertisement image covered the distorted letters, malicious programs are harder to attack Clickspell. In additions, there is no need to know any higher level English and carry out task of entering English characters.

Thus the project helps to carry out the task that tells Computers and Human apart by using the A Spelling Based CAPTCHA System By Using Click.
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REFERENCES


