

Human Friendly CAPTCHAs: Simple Games

Deapesh Misra
ECE Department
George Mason University
Fairfax, VA, USA
dmisra@gmu.edu

Kris Gaj
ECE Department
George Mason University
Fairfax, VA, USA
kgaj@gmu.edu

ABSTRACT

The need to detect web bots pretending to be human on the internet is growing. This led to the development of tests called CAPTCHAs, which try to detect the presence of a human user. A majority of CAPTCHAs and particularly those which have been employed currently are keyboard and English character based. We propose a novel scheme in which the CAPTCHA test is a simple game which the user has to play successfully in order to pass the test. Playing interactive games is easy and considered fun by human users while is tough for programs to complete successfully.

1. INTRODUCTION

Internet reaches into our lives more than ever before and continues to increase its sway upon our daily lives. In such a networked world, human to human interactions are increasingly being performed through the web. This has resulted in new scenarios never considered before. For instance, the need to authenticate that the entity on the other side of the internet is a human and not a program pretending to be human is one such consequence.

Human Interactive Proofs (HIPs) are schemes which require some kind of interaction from a human user that is tough for a program to simulate. Successfully completing such an interaction is considered as a proof that the user is a human. "Completely Automated Public Turing test to tell Computers and Humans Apart" (CAPTCHAs) are a class of HIPs [2]. These CAPTCHAs act as filters which allow only human users to pass through.

A CAPTCHA should have the following properties

- * Most humans can pass them easily
- * Current computer programs can not pass, unless they guess correctly
- * Their strength is not based on secrecy
- * They can be generated and graded by a program quickly

2. EXISTING SCHEMES

A large number of schemes already exist, some being Artificial, Implicit Captcha, Pessimal print, Baffle text, Scatter type, the Microsoft HIP, Collaborative Captchas, Face Recognition CAPTCHAs etc. Most of these schemes are English character based. English character based schemes assume that the test taker has prior experience with the character set. Also since these schemes generally test error correction capabilities of a human, there is a certain level of stress involved with them which the test taker undergoes. As text recognition systems grow more powerful the level of distortion will have to increase, thus making these distortion based schemes tougher and tougher for humans.

3. PROPOSED CAPTCHA TEST

We propose a new CAPTCHA which is more universal than existing character based tests and also is easier and fun for humans to take.

The proposed CAPTCHA relies on the user being able to successfully play a simple game and is thus visual in nature. The test taker plays a simple game using the mouse/touchpad (or keyboard) as the input device.

A very simple game is presented to the user, having been chosen randomly from a large pool of games. If the user is able to complete the game successfully, then the user is judged to be a human, else the user is judged to be a machine. Playing this simple game provides the hardness to the CAPTCHA. A machine would be unable to play this game while a human user can play this simple game very well.

We propose the use of 'Macromedia Flash' [3] based games for such simple CAPTCHAs as such games are already widely spread over the internet. Recently there has been a growth in the presence of such simple games on many websites and as of now such games are generally advertisements for products. Screen shots of a few of these simple games are as shown in Fig. 1. We propose the use of such simple games as CAPTCHAs. For instance with reference to Fig.1, a CAPTCHA could ask the user to make the Frog eat a certain number of flies, say four flies.

Most of the simple games require a mouse. But this is not a limitation at all as simple games which need just the keyboard also do exist and can be created. The best games for our scheme would be those which can be played with either



Figure 1: Simple 'Catching a Fly game' and 'Shooting game'

the mouse or the keyboard.

4. ANALYSIS OF THE SCHEME

A general discussion of our scheme follows.

4.1 Security

In this CAPTCHA scheme, the verification of the answer of the CAPTCHA is done locally at the user's end. This raises concerns about the validity of the test result, since the user can modify the results and send it to the server without even having tried the CAPTCHA. The other easy attack would be to sniff the packet being sent to the server to understand its structure. These are problems which are common to online games. Existing schemes to prevent online gamers from cheating need to be applied here. We are looking into existing schemes to protect online games, so that they could be applied to our scheme.

4.2 Usability

The first obvious assumption that is made is that the user of such a CAPTCHA has a mouse/touchpad and is reasonably comfortably using it. Since the level of skill required to use such a pointing device is very little, we assume that almost all users will find it easy to play these games. In case the user does not have a pointing device then the user will have to request for a keyboard based game. These simple games have a small size. Thus the download times are not an issue. The other potential issue could be the amount of time that a test takes to complete. In this regard, judicious choice of the games offered as a test would ensure that these games take not more than a few clicks to complete within a couple of minutes.

The possibility of the user's browser not being able to run the game seems to be a rare case since the 'Macromedia' website reports that, as of September 2005, 97.3% of all the computers connected to the web in the world already have the Macromedia Flash player installed. Moreover other programming environments to develop such simple games can be thought of, for instance Macromedia Shockwave, 3D Groove, WildTangent etc.

Users who being irritated and frustrated a lot by unwanted flash based advertisements have disabled flash content, would

have to allow flash programs to run on their browsers.

Playing games has always been considered as a 'fun activity', more so if the game is simple enough. Thus the user is not stressed at all in completing this CAPTCHA. Also such simple games have no complicated rules nor complicated instructions. They are intuitive enough that the user can start playing after just having read one line of instruction. These games are universal in nature and also are not restricted to any age group. Test takers with visual disabilities will have to perhaps request for a different kind of CAPTCHA, such as an audio CAPTCHA.

To prove our assumptions with regards to usability we plan to perform tests with human users.

5. REAL WORLD EXISTENCE

The kind of simple games that we propose to use in our scheme, already exist in the real world, though they are being used with a different purpose in mind. A recent concept on the internet scene is that of 'Advergaming' [1] and this led to an exponential increase in the creation of such games. These are games that are used by advertisers to attract consumers, to help in brand awareness and to increase brand recall.

So we can reuse a simple Advergame as a CAPTCHA. This would perhaps keep both the web service provider and the human test taker happy. This offers an extended capability to a CAPTCHA.

6. CONCLUSIONS

The proposed new scheme of using simple games as CAPTCHAs has many advantages that current CAPTCHA systems are lacking. These CAPTCHAs being very simple in nature and being perceived as a fun activity will be accepted by internet users much readily than the presently used CAPTCHAs based on text distortions. This would mean that CAPTCHA based authentication schemes can be widely deployed without fear of user backlash.

We need to find if our assumptions with regards to the ease of this scheme are true or not by conducting user trials. The security aspect has to be looked into and perhaps ideas borrowed from the online gaming schemes. Our scheme seems to promise both the qualities of being human usable and secure at the same time.

7. REFERENCES

- [1] Advergaming. http://www.innoken.com/ar_brandgames.html.
- [2] The captcha website. <http://www.captcha.net>.
- [3] Macromedia website. <http://www.macromedia.com>.