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A Study of Different Types of CAPTCHA Methods

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ABSTRACT:

CAPTCHA (Completely Automated Public Turing test to inform Computers and Humans Apart), a security task that measures human and robot interventions. It is a kind of Turing test via which a programmed intervention can be detected by means of its behavior or problem solving. Various CAPTCHA challenges are available such as distorted string, picture recognition, sound, math and recreation CAPTCHAs. The recreation project is interactive and exceedingly secure in contrast to different CAPTCHAs. In this form of CAPTCHA, the user has to solve the AI hassle either through drag or click method, relying on the game. The put up is supposed to overview a range of applied CAPTCHAs and evaluate their weak and protection parameters. Many image CAPTCHAs are based totally on click-based strategies where the consumer must pick out the pix via their look and click on accordingly. But this kind of CAPTCHA can be affected via photo processing techniques like object classifier. Dragging an object to the target region is an efficient method, however it have to be finished or solved through an mental problem. If you drag an object to the goal location using object recognition, the system may be broken when passing attacks.

Keywords -CAPTCHA , Bot programs, spammer, Scrapers.

1. INTRODUCTION:

The Internet has brought great benefits in many areas of human life such as communication, education and online commerce. Some web services requir e online registration, where users provide information to connect and use services such as Yahoo, Gmail, and Hotmail. However, hackers have created many programs that automatically fill the registration pages of the website with false information, which can cause crashes, poor performance, and som etimes even system failure, especially when the website has a large number of users. bill. Therefore, the researchers developed a strategy to distinguish between human users and computers in online registration data. The standard technique currently used to solve this problem is CAPTCHA (Completed Search Engine Optimization to Tell Computers and Humans Apart).

The concept of captchas is based on the ability of humans to perform certain tasks that computers cannot do, such as asking users to understand garbled text images or special photo options from many photos. Many captcha types have been created in recent years. Some are based on optical character reco gnition (OCR), such as text captchas, while others are based on negative character recognition (non-
OCR) using mass media such as audio and video. Some of these captchas are broken by new bots. For example, textual captchas can be broken using th e fragmented text technique.

This article will explain the new types of captchas proposed in recently published documents, explain their classification, and compare captchas accordi ng to their strengths and weakness.

Definition of CAPTCHA:

"A CAPTCHA is a program that protects websites against bots by generating and grading tests that humans can pass but current computer programs cannot. For example, humans can read distorted text as the one shown below in figure 1 but current computers cannot

Application of CAPTCHA:

1.Domain registration protection: Captcha is used to protect many free email services such as Yahoo, Gmail and Hotmail from bot services that use automated scripts to register thousands of email accounts every minute.

2.Protect against email scraping: This can be done by hiding the user's email address from web scraping by requiring the user to solve a captcha before revealing their email address.

3.Online Voting: CAPTCHAs are also used to prevent users from participating in online voting by web browsers and bots who want to vote by resolving the CAPTCHA before sending the ballot. However, this does not prevent users from voting multiple times.

4.Dictionary protection: This is to prevent computers from repeating the entire password field by asking users to solve captcha tests after many failed attempts. This is better than closing an account after several failed logins.

5.Search Engine Bots: Administrators can use captchas to block search engine indexing to prevent others from downloading or reading these websites, as they sometimes contain private information.

2. History of CAPTCHAs:

• In 1996, Moni Noar proposed using the automated Turing test to distinguish human users from robots.

• 1997 Andre Broder et al. It's a concept designed to isolate human users from computers, and that same year the Altavista website used this method, prompting people to use bad English and asking them to copy it, resulting in bots.

• 2002 Broder announced for over a year that it is using a captcha system that reduces the number of spam ad URLs by more than 95%

• 2000 The term "captcha" was coined by a team at Carnegie Mellon led by Manuel Blum and Luis von Ahn was done. University.

• In 2003, Barid and Monica Chew from California created the Baffle text captcha.

• In 2004, the Yahoo website used a simplified version of the EZ-Gimpy method.

3. CLASSIFICATION OF CAPTCHAS

The meaning of CAPTCHA introduces a challenge response test to the users even though human or bot programs. The CAPTCHAs can be classified into five types depend on what is distorted that is whether characters, digits, or images .These types are given below:

1. CAPTCHAs based on text.

2. CAPTCHAs based on image.

3. CAPTCHAs based on audio.

4. CAPTCHAs based on video.

5. CAPTCHAs based on puzzle.

3.1. CAPTCHA Based on text

The text is simple to use, presents letters and numbers to the user and adds some modifications to the characters such as noise, explosion, rotation or 3D to prevent bots from reading the actual content. picture.

3.1.1. Gimpy CAPTCHA:

The process behind this method is to make distorted and distorted images by occasionally selecting characters and adding black and white lines, making non-linear adjustments, and asking the person to use the correct characters.

Gimpy was created in partnership with Yahoo to prevent spammers from posting ads in chat rooms and typing to generate free email.

3.1.2.EZ-Gimpy:

This is a simplified version of Gimpy CAPTHCA which is easier to learn than Gimpy CAPTCHA.This method is used for authentication purposes in Yahoo chat rooms and also during registration.

3.1.3. Pessimal Print:

This type of CATCHPA is not much different from Gimpy and Baffle texts.

CAPTHA here uses an image degradation model that addresses about a dozen physical printers and image files. Parameters include spatial sampling rate and error, symbol size, blur, and threshold.

3.1.4 a. Baffle Text:

Baffle Text was developed at the Palo Alto Research Center by Monica Chew (UC Berkeley) and Henry Baird (Palo Alto Research Center). In this type of captcha, the user sees non-English words and these words are converted to their images, such as printing the image and scanning it back or using standard layers to start sending. Image like from black and white and vice versa. This changes the grayscale and adds random noise to the image.

3.1.6. 3D CAPTCHA:

Imsamai & Philoltares enhanced the CAPTCHA text using 3D characters. This method relies on humans' ability to easily recognize 3D characters, while computers cannot. CAPTCHA consists of 6 alphanumeric characters consisting of letters and numbers. Many changes have been made to the character, which increases the difficulty of exceeding level.

3.2. CAPTCHA based on image:

Image based captchas are based on identifying certain images from similar images that are sometimes confused with some words. Bots have a hard time seeing images that humans can remove. Image based

3.2.1.Bongo:

This type of CATCHA prompts the user to fix the problem by finding a known model. Show two sets of blocks, one on the left and one on the right.

T block on the left is different from the block on the right and the user has to find the unique piece that separates the two pins. In this case, the difference between the left and right series is that the blocks on the left are drawn with thicker lines, and those on the right with thin lines. After determining the features that distinguish the two series from each other, the user is presented with four different sets and asked to decide which side they are on.

3.2.2. Pix CAPTCHA:

Pix CAPTCHA is used for everyday objects (dogs, flowers, etc.) The user is shown four different pictures of the same object and has to type a word to indicate the object or idea that all the pictures contain.

3.2.3. Drawing Captcha method:

This method is used for PDA (Personal Digital Assistant) and other devices using style. In this model, a screen with background noise is prepared and many dots are drawn on it, then the user has to connect some dots together . Humans can easily do this task, but computers cannot. Another advantage of this method is that the user does not need to be able to use special words.

3.3 CAPTCHAs based on audio:

This mechanism is known as visible CAPTCHAs in case of visually impaired users. Another type of audio captcha in which customers aren't required only to pay attention but to preonounce a sound captcha in which a consumer need to hear the secntence chosen randomly . Here, it is beceessary to take into consideration computers' disability to understand sound in noise distortion. It depicted in offering acquainting words to the consumer performing in voice sound, so the client is requested to write what he/she has heard for fixing the CAPTCHA. The characteristics of this variety is that it can be utilized for the users they have difficult trouble in hearing. The check challenges the consumer to write letters of a phrase in an audio clip a. Both male and female voices are used in frequent audio CAPTCHAs.

3.4 CAPTCHA based on the video:

A short action video includes an character talking to some type of activity and the customer need to pick out the right depiction from the rundown. This proposed video based totally on advertisement. The extent of the video in this approach is large so the customers will confront the hassle when vide are downloading it from website. This issue can lead patron to exit the film clip.A short movie clip shows a character doing some actions to the user proven in figure, then a group of sentences describe one of a kind actions proven to the user.

3.5 CAPTCHA primarily based on a puzzle:

The patron have to remedy a conundrum that depicts on offering lumps of images and inquiring for that the person consolidates the portions or recognize a particular piece of the image shown in determine. It consists of numerous types:-

3.5.1 CAPTCHA Star: Based on human cognitive ability to recognize specific shapes, it prompts the person with some stars into a square. The star's function adjustments in accordance to the position of the cursor. The person have to move the cursor in the drawable area till the shapes are diagnosed through the aggregated stars.

3.5.2 DND CAPTCHA: Drag and Drop CAPTCHA. DND is developed in [2009]. The User is asked to drag every letter of a particular phrase that was once displayed in distorted nature and drop it in the right function of this character.

3.5.3 Tap CAPTCHA: The important concept of format Tap CAPTCHA is structured primarily based on a hybrid project that merges two puzzles. textual content focus puzzle and form movement puzzle.

3.5.4 M CAPTCHA: Known as Mobile CAPTCHA a new Human Interactive Proof approach (HIP) blocks Bot via asking the consumer to draw a randomly generated sample as a graph as illustrated in figure. It developed to use in touch monitors such as smart mobile phones.

4. Performance Analysis:

Criteria / Type	Security	Usability
CAPTCHA Based on text	low	Middle
CAPTCHA Based on image	High	High
CAPTCHA Based on audio / video	Middle	Middle

Accessibility:

1. CAPTCHA based on text: Some subject appear to the consumer for getting into the correct character. Some motives that lead the consumer to distinguish the right character include the usage of exclusive lines, shapes, a number of fonts, font dimension variation.

2. CAPTCHA based totally on image: The customers that have color blindness will face some trouble

3. CAPTCHA based on video: The content material of documents is very huge , the pace of showing video, etc.

4. CAPTCHA based on audio: The availability of this gadget only in English. Hence it doesn't work for a deaf person or a foreign language speaker.

5. CAPTCHA based totally on puzzle: The customer cannot without problems recognize the puzzle. It is regarded as a waste of time.

5. Types of attack on captchas:

1) Brute Force Attacks: The Common attack used when the CAPTCHA check based on a limited quantity of solutions, then, the sponge can use the sensitivity information to robotically assault CAPTCHA small print by trying answers at random or according to a selected sequence .

2) Signal Processing Attacks: Common assaults in the picture and audio-based CAPTCHAs. Using chaos, noise and disruption that are used to fuzzy and disorganize captcha primarily based on photo and sound are viable duties For machines to do, but the attacker can solve Image CAPTCHAs via doing away with the noise and distortion the usage of Optical Character Recognition (OCR) technique or with the aid of mathematical heuristics and laptop getting to know algorithms also besides, he/she can destroy Audio CAPTCHA the usage of some desktop mastering algorithms, for example, Ada Boost, Supporting for Vector Machine/, and (K-NN) which imply K-Nearest Neighbor to recognize the said characters within noisy voice Environment.

3) Smuggling Attack: it is used when the attacker injects mocked CAPTCHA the Challenges are replaying an figuring out on-line undertaking robotically for example mail registration, Login Social Application such as Facebook applications, commenting on or sending message/photo or Sending pal requests. The behavior of this attack is controlled with the aid of the attacker. The script begins by means of the consumer performs an on-line task at first that the attacker wishes to delay the mal-ware on the victim's host intercepts the request and domestically shops all information.

4) DE-CAPTCHA Pipeline Attack: it is used to wreck text-based CAPTCHA and consists of 5 ranges that are performed on a unique text CAPTCHA to remedy it.

4.1 Preprocessing: It can be negligent if the photograph is noise-free. Removing background by using the use of exceptional approach and CAPTCHA is regarded in white and black and saved in binary matrix. The transformation of captcha into binary matrix makes the DE CAPTCHA pipeline easier for implementation.

4.2 Segmentation: reducing of CAPTCHAs through the use of exceptional segmentation method, such as CFS (Color Filling Segmentation) which primarily based on a paint bucket flood filling algorithm in its work . CFS is a default segmentation technique so it approves to phase of the CAPTCHA phrases alternatively they are tilted and over- lapped.

4.3 Post-Segmentation: The segments that are resulted in the preceding stage are processed in my view for making the cognizance easier. The segments magnitude are usually

4.4 Recognition: By using coaching mode to study the classifier what the character like after the CAPTCHA has been segmented. In the checking out mode, the use of classifiers in predictive mode to detect each letters individually.

4.5 Post-processing:The classifier's output is getbetter and enhancing potentially by the usage of spell checking methods to increase the accuracy and law of the Output.

5) Vidoop CAPTCHA Attack: Special type of image-based CAPTCHA attack. It uses snap shots of objects, animals, humans or landscapes, as a substitute of distorted text, to differentiate humans from a computer program. The task of an image that consists of countless snap shots representing specific

categories. Every picture related with a letter that is mounted in it. To bypass the challenge, asking the person to record the letters corresponding to a listing of required classes.

6) Teabag 3D Attack: Its layout is based on three-dimension house such type of 3D CAPTCHA is characterised with some properties: The 3D-CAPTCHA take a look at displayed on a grid in 3D area as depicted presented as four letters the use of Only Upper case and digits .Characters are very close to every other Appears to be produced from slightly a range of viewpoints. There are small difference in grid direction and the form of heritage cells between the introduced challenges to the assault mannequin for breaking Teabag 3D- CAPTCHA can be described into four phases.

6. Conclusion:

This paper has brought the thought and records of CAPTCHAs, CAPTCHA functions and describing the a number CAPTCHA techniques based totally on text, images, voice, video, and puzzle. Although besides, discussing the strength, weak spot of each category the most essential elements for evaluation and the learn about of the test, which are usability. In addition, it discuss of the varition between the various schemes. Moreover, significant pointers are proposed for designers. The CAPTCHA technology works on the a number algorithms for the enhancement and additionally working on the above-mentioned problems over time. As a final point, the paper conducts a complete survey of exceptional existing strategies of CAPTCHA systems and how they are used for offering authentication.

7. References:

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