

Security in field of CAPTCHA in the form of intellectual Game

Rahul Gupta¹

Sudhir Goswami²

Sheetal Gupta³

Abstract: A Turing test is needed in the time of unnecessary Internet use to battle assaults on sites by distancing machine-based human exercises. Subsequently, comparable to the security of a site page, the CAPTCHA is useful probably as a twisted book, math, OTP (One Time Password), CAPTCHA Audio, 3D, Graphic and Gaming. Manual human test speaks to a completely mechanized Public Tour Test to distinguish Computers and Humans, a test that decides if a communicating client is human or a robot. One of the profoundly made sure about CAPTCHAs that is right now moving is among various executed procedures Gaming CAPTCHA. The greater part of the game CAPTCHA depends on basic rationales, in which clients can understand the game by hauling objects to their objective areas and now and again even people experience issues settling them. A CAPTCHA should be as basic as people can explain, which is practically difficult to determine by robot, inside a couple of moments. This framework offers preferred security over the current CAPTCHAs. Here the proposed framework gives better security. The proposed game is profoundly graphical and appealing, and can rouse clients to determine it without disturbance. The proposed game requires the acknowledgment of discourse articles and some consistent moves that mask fields of info. Game has a few AI issues in different stages, which make it more scholarly than the past one. The framework 's thought process is to give the most elevated conceivable degree of insurance, which is difficult to break and supplant existing frameworks.

Keywords: Gaming CAPTCHA, Robot, Action Script, Web Security, Intellectual game

I. INTRODUCTION

CAPTCHA is now well conceived as a widely employed technique that web services use to avoid unusual relay attacks on their systems. It is essentially a Turing test necessary to determine whether the accessed customer is a human or a robot. Several categories of CAPTCHA are now available and their authentication levels vary accordingly. CAPTCHA is considered as an essential technique that prevents unlawful access to a website from junk entries. The CAPTCHA technology is frequently used to secure websites. Using CAPTCHA as a mechanism of protection against robotic attacks is essential and generalised on almost every web page. CAPTCHA Gameplay is one of web applications' highly

secured CAPTCHAs. Most of the CAPTCHA playing programmes are based on the simple logic of dragging objects to the target position, and others are difficult to resolve even for people because of the level of difficulty. A Captcha should be easier to solve than humans, which could virtually not be solved by a robot. In CAPTCHA Games, the user has to play a game to submit or proceed successfully. Fig 1. Shows relay attack that can affect the security of drag and drop based games



Fig. 1. Drag & Drop based CAPTCHA [5]

simply flash based content that require plug-in or flash player that almost every browser supports. There are generally three types of gaming CAPTCHA that have been developed till now-

- Click Based – e.g. Parking Games
- Drag and Drop – e.g. Puzzle Games
- Key Based – e.g. Sokoban Games



Fig. 4. Bird shooting [9]

Fig 4 shows the targeted birds to be shot in the Next Gen CAPTCHA. These simple logics require intellectual games to be replaced which can only be managed by. Here, the system proposed is capable of offering an intellectual game.

II. LITERATURE REVIEW

The systems previously developed are either based on simple drag-and-drop objects to the target location or on simple clicks. JingSong et al. [1] suggested a CAPTCHA with a complex background appearance of distorted moving alphabets. By overcoming the CAPTCHA, a client who wants to access the server's web pages needs to prove his identity. It is supposed to be difficult for a robot to solve the CAPTCHA proposed in this article. The extent of sophistication that has been integrated into the CAPTCHA provided for that.[2] notes the drawbacks of 2-D CAPTCHA, as it belongs to simple approaches and 2-D CAPTCHA can be harmed by an intelligent device or image processing technique. This paper suggested a CAPTCHA whose technique depends on the alphanumeric character's 3D animation to distinguish a robot and a human. It could be hard for a person to understand 3D photos and if it comes with an animated backdrop, even for a person to recognise, the degree of hardness rises. Thus, 3D animation will not be seen as an appropriate CAPTCHA method in which a Turing test could be performed. Ibrahim et al.[3] suggested a device that is only a step ahead of CAPTCHA 3D animation, but linked to it somewhere. A color cube can appear in this technique, comprising various alphabets with distinct background colors on all faces. Visitors need to rotate the cube and mark all the characters along with their respective color backgrounds to solve this CAPTCHA. This article suggested an amazing CAPTCHA process, but along with confounding color variations, it consumes more time. By using any intelligent machine via color detection as well as character recognition, the proposed framework could be violated. Aadhirai et al.[4] have suggested a CAPTCHA that is smart enough to distinguish between a human and a robot. An picture of the real world will be shown by the proposed technique and the user will be asked to locate an object, according to their distance from the oriented object. For eg, the user asked in the CAPTCHA below in the figure to find an item that is the farthest from the construction worker. Song Gao et al.[5] suggested a security thread for CAPTCHA gaming, i.e. relay assault, which can affect the security of games based on drag and drop. By real-time object recognition, the objects and target can be identified and it is capable of distinguishing foreground and

backgrounds that can highlight all the objects in the image. The framework is capable of cracking all complex cognitive CAPTCHA based on dragging and falling objects at a specific target position. Seyed Mohammad Reza et al.[6] indicated that reCAPTCHA is one of the most recognized CAPTCHA used by some well-known organizations such as Google, Yahoo, and Facebook etc. The form used in this CAPTCHA is like an example in the figure below, which consists of two distinct words taken from the old text book and users need to remember those two words and write them on the text box to prove their identity. An intelligently-trained neural network system and OCR will crack this technique. This CAPTCHA is time-consuming and frustrating at times that a user might find irritating. S. A framework based on mini games that are designed using HTML5 and Java Script has been proposed by Ashok Kumar et al. In this project, there are four different games that were planned. Fundamentally, these games are web based. Users need to click on the yellow birds in Fig.4 to confirm their identity. The HTML and JAVA script application is web-based and its encoding can be easily extracted because of its URL (Uniform Resource Locator) availability, due to which web attacks can affect the security premises. Fig 3 shows farthest object from the construction worker to be identified by the user

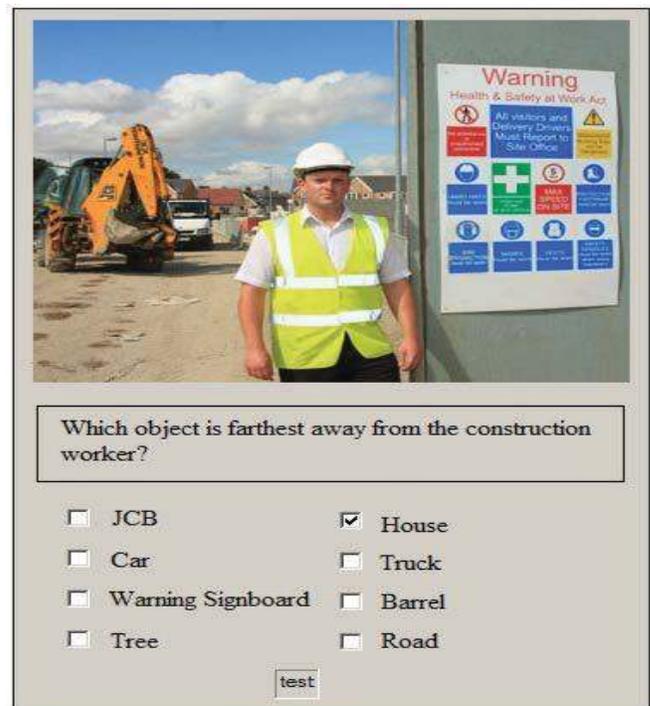


Fig. 3. Distance based CAPTCHA [4]

III. PROBLEM IDENTIFICATION

There are no AI issues with dragging objects to the target location or clicking on desired objects. In HTML5 and JavaScript, these mini games are built where implementation can be accessible to all. In click-based games, there are x and y coordinates for each object to address the location. Games are constructed using different layers that either represent an object or a script for each layer. A paper on IEEE transaction that mentioned hybrid attack is already published that can crack gaming CAPTCHAs based on simple logics. These games are referred to as the Complex Cognitive Game, which can be influenced by a relay attack. The previously proposed game was designed to recognize and involve clicks from a picture of yellow colored birds. The goal object can be retrieved by a simple color detection method and the game can be cracked.

The W server can submit flash content to the local computer when a valid U user communicates with the W web server. Since the Stream Relay attack uses game play features, the log of U's mouse or keyboard interactions with the game is sent to W when U finishes the game successfully. W then executes an input detection algorithm for that log, and responds by accepting (or dismissing) U. The attacker A obtains the gaming CAPTCHA challenge from W, just like a legal person, under Stream Relay. The attacker runs a streaming server and a streaming client connects the human solver S to the attacker's computer. This streaming program is responsible for transmitting to S the gaming CAPTCHA frames and sending to A the mouse interactions of S, such as drag-and - drop, mouse clicks and positions. The record of this interaction between S and the game is clearly forwarded to W by A. Finally, by rejecting (or accepting) A, W would run the detection algorithm on input for that log, and answer back. Fig 8 displays the Stream Relay attack flow diagram. The hypothesis is that S can suffer from the deterioration of game quality at the end of users due to network latency. This degradation would reduce the performance of the game for CAPTCHA gaming. More importantly, it will differentiate the interaction of the solver with the game from the interaction between the legitimate user and the game (as in the usual environment) and thus make it possible for the server to detect the relay attack. The proposed framework does not require gameplay logs to accept or deny server users. The proposed game can send type data directly, but it can be done from the local machine only after a successful attempt and no need to authenticate from the server. Fig 6 shows the extracted knowledge which displayed in the foreground mask.

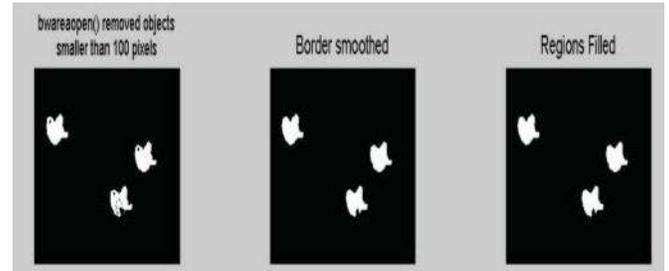


Fig. 6. Extracted knowledge from the solver's response displayed in the foreground mask

IV. PROPOSED WORK

Instead of being based on complicated AI issues, the game that has been proposed in this paper has no clear logic. The proposed game is an intellectual puzzle where by its sound that horns when mouse over, users would have to distinguish non-functioning vehicles. Users need to click on it after recognizing the correct vehicle to allow the drag and drop feature. Dragging objects will only operate after the correct vehicle has been identified. The goal is for the vehicle to enter the garage. Users would have to delete vehicles from their route and only the keyboard arrow can hit the target location of the vehicle. If the vehicle has entered the target location, input fields will be unhidden and it is possible to send a form from there. In order to overcome the CAPTCHA, there will be a time limit along with a good submission of type that is 90 seconds more than enough for humans. The work proposed involves analytical efforts that can only be solved by humans and by robots that are almost impossible. Instead of being archived with a game that can only unhide after a good attempt, the HTML form is not present in any URL. The framework suggested three levels of protection such as—

- A) Identification of Speech Based
- (b) Drag & Drop for Vehicle Unlocking
- C) Use a keystroke to pull the object to the target location.

The machine has reloaded a new issue in which the target vehicle and the target area are modified. The time limit will be the same and only after a successful attempt will the form appear. The framework proposed is capable of providing a better level of protection against web-based attacks. The most

popular system-affected attack is based on the game play log. Game Play Log is a temporary or temporary file

Approved licensed use, restricted to: University of Technology of Auckland. Downloaded at 09:51:26 UTC from IEEE Xplore on June 05,2020. Restraints apply.

These game play logs send the channel to the server to verify whether or not the game is played with right motives and to accept or deny users accordingly. But the attacker is able to save the game play log from the legitimate client computer and forward it from his machine, enabling unauthorized users to register for form submission. The previously proposed game play log is used to approve or deny users who are totally dependent on the response of the server. Instead of validating the user on the client machine during the game, the proposed method does not use game play log, and only user details must be submitted after a good game play. Fig 7 Shows When correct vehicle is recognized by the user.



Fig. 7 Correct Vehicle Recognition

V. RESULTS AND DISCUSSION

The proposed game does not bear a server load. In order to limit the vehicles for collision avoidance, hit object limitation and rectangular bounded area have been used [10]. An algorithm's time complexity means the cumulative time taken by the program to run until its completion. A function's time complexity (or set of statements) is $O(1)$ since it does not have a loop or recursion. For single statements that are specified as $O(1)$, time will be constant and for N number of statements it will also be stated as $O(1)$ since the time complexity is not

influenced by N number of statements. The complexity of space is $O(1)$, which is constant as the algorithm uses a fixed amount of space that is not dependent on the input. The algorithm would take up the same (constant) amount of space for every input size. Drag and drop is not limited to the game; it also involves user clicks, main interaction, etc. The response time is 11 seconds on average for the right click and 3 seconds for the object to be dragged from one position to another. Accordingly, movement through the keyboard arrow is constant with +5 towards the x-axis or y-axis. The motion can only be rendered in the direction of the goal location, which can only operate when there is no front blockage.

The first step in the flow chart is to initialize the timer t for 90 seconds, initially drag and drop disabled, which works as per speech analysis only after the correct press. But users will be able to start dragging vehicles when the correct vehicle or object has been recognized or clicked. The time limit is then validated by the current timer and if it goes higher, then the process will be terminated and the reload button will appear. Else, the device will continuously check if the target vehicle enters the destination area or target area, if yes, it will view all input fields together with the submit button, otherwise it will remain searching for time validation and achievement of the target.

Two attacks on the proposed game were carried out there, such as—

- A) Subtraction from Foreground
- (b) Study of Expression

A context has been filtered in foreground subtraction with the elimination of all targets and later compared with the original image that can remove all objects, but no objects have been removed from the image and the attack fails to recover it. A framework was developed using MFCC (Mel Frequency Cepstral Coefficient) in speech analysis that is capable of recognizing individual speech as it was trained for. But because of similar kinds of speeches, this approach often fails to evaluate the target voice. Thus, no attack will impact the game to destroy its security premises.

Let the algorithm be more accurate.

A. CGT (Conundrum Theory of Games) Algorithm:

Require: Target set G , current state s , steps m , target object O , target position T , time t , push object p , block object B and non-target position n .

Input: Drag & Drop Left / Right / Up / Down Arrow Click on the mouse

Output: $O(x, y) > T(x, y)$ /x-axis, y-axis, y-axis

Phase 1: Steps and steps

Approved licensed use, restricted to: University of Technology of Auckland. Downloaded at 09:51:26 UTC from IEEE Xplore on June 05,2020. Restraints apply.

Phase 2: t dss t dss

Stage 3: Drag objects with a drag

Two attacks on the proposed game were carried out there, such as—

A) Subtraction from Foreground

(b) Study of Expression

A context has been filtered in foreground subtraction with the elimination of all targets and later compared with the original image that can remove all objects, but no objects have been removed from the image and the attack fails to recover it. A framework was developed using MFCC (Mel Frequency Cepstral Coefficient) in speech analysis that is capable of recognizing individual speech as it was trained for. But because of similar kinds of speeches, this approach often fails to evaluate the target voice. Thus, no attack will impact the game to destroy its security premises.

Let the algorithm be more accurate.

A. CGT (Conundrum Theory of Games) Algorithm:

Require: Target set G , current state s , steps m , target object O , target position T , time t , push object p , block object B and non-target position n .

Input: Drag & Drop Left / Right / Up / Down Arrow Click on the mouse

Output: $O(x, y) > T(x, y)$ /x-axis, y-axis, y-axis

Phase 1: Steps and steps

Approved licensed use, restricted to: University of Technology of Auckland. Downloaded at 09:51:26 UTC from IEEE Xplore on June 05,2020. Restraints apply.

Phase 2: t dss t dss

Stage 3: Drag objects with a drag

Move 4: /Check that the object is clicked if O is clicked, then if O is clicked

True Drag Objects

Phase 5: shift = (s) for all m bound rectangles;

If (is-is-valid(move, state))

Make move(move, state);

Terminate if if

End for the

Phase 6: B n n n n n

If $B(x, y) < O(x, y)$ then /x, y axis p.visible e p.visible e(x, y)

Left. Trigger the e/keyboard arrow arrow

Right. Enable e /keyboard arrow

Up. Activate the e/keyboard arrow arrow

Down. Enable ue /arrow on the keyboard

Terminate if if

Phase 7: Do (t > 0) thus

True Drag Objects

End While Finishing

Phase 8: Then, if $O(x, y) > T(x, y)$

Form. Visible Rue Visible

Terminate if if

Phase 9: End to the Endove 4: /Check that the object is clicked if O is clicked, then if O is clicked

True Drag Objects

Phase 5: shift = (s) for all m bound rectangles;

If (is-is-valid(move, state))

Make move(move, state);

Terminate if if

End for the

Phase 6: B n n n n n

If $B(x, y) < O(x, y)$ then /x, y axis p.visible e p.visible e(x, y)

Left. Trigger the e/keyboard arrow arrow

Right. Enable e /keyboard arrow

Up. Activate the e/keyboard arrow arrow

Down. Enable ue /arrow on the keyboard

Terminate if if

Phase 7: Do (t > 0) thus

True Drag Objects

End While Finishing

Phase 8: Then, if $O(x, y) > T(x, y)$

Form. Visible Rue Visible

Terminate if if

Phase 9: End to the End

VI. CONCLUSION

In this manner the Non-Intrusive Intellectual Gaming CAPTCHA gives best CAPTCHA till now that is better ready to separate human and robot. Paper showed a few assaults over recently proposed CAPTCHA and separated their disadvantages. There are additionally different hand-off assaults have been applied over the proposed game and shows achievement and disappointment rate. The current proposed idea of scholarly gaming CAPTCHA can be upgraded in future with more savvy and fake issue that can be effortlessly understood by human yet practically inconceivable for bots. The future work can actualize a framework that can deny any

sort of assaults and there would be a punishment or lapse of CAPTCHA for each off-base Endeavor.

REFERENCES

- [1] JingSong Cui, LiJing Wang, JingTing Mei, Da Zhang, Xia Wang, Yang Peng, WuZhou Zhang, "CAPTCHA Design Based on Moving Object Recognition Problem" in the 3rd International Conference on Information Sciences and Interaction Sciences, Chengdu, China, 2009.
- [2] Jing-Song Cui, Jing-Ting Mei, Xia Wang, Da Zhang, Wu-Zhou Zhang, "A CAPTCHA Implementation Based on 3D Animation" in International Conference on Multimedia Information Networking and Security, Hubei, China, 2009.
- [3] Ibrahim FurkanInce, YucelBatu Salman, Mustafa ErenYildirim and Tae-Cheon Yang, "Execution Time Prediction For 3D Interactive CAPTCHA By Keystroke Level Model" in Fourth International Conference on Computer Sciences and Convergence Information Technology, Seoul, South Korea, 2009.
- [4] Aadhirai R, Sathish Kumar P J and Vishnupriya S, "Image CAPTCHA: Based on Human Understanding of Real World Distances" in 4th International Conference on Intelligent Human Computer Interaction, Kharagpur, India, 2012.
- [5] Song Gao, Manar Mohamed, Nitesh Saxena and Cheng cui Zhang, "Gaming the Game: Defeating a game CAPTCHA with efficient and robust hybrid attacks" in IEEE International Conference on Multimedia and Expo (ICME), Chengdu, China, 2014.
- [6] Seyed Mohammad Reza1, Saadat Beheshti2 and Panos Liatsis3, "How Humans Can Help Computers to Solve an Artificial Problem survey", International Conference on Systems, Signals and Image Processing (IWSSIP), London UK, 2015.
- [7] Cao Lei, "Image CAPTCHA Technology Research Based On The Mechanism Of Finger-Guessing Game", Third International Conference on Cyberspace Technology (CCT), Beijing, China, 2015.
- [8] Nitisha Payal1 and Rama Krishna Challa2, "AJIGJAX: A Hybrid Image Based Model for CAPTCHA/CaRP", Uttar Pradesh Section International Conference on Electrical, Computer and Electronics Engineering (UPCON), Varanasi, India, 2016
- [9] S. Ashok Kumar1, N. Ram Kumar2, S. Prakash3 and K Sangeetha4, "Gamification of Internet Security by Next Generation CAPTCHAs" International Conference on Computer Communication, Coimbatore
- [10] D. Rajpal and A. Tiwari, "Non-Intrusive Intellectual Gaming CAPTCHA for Optimal Web Security," 2018 International Conference on Advanced Computation and Telecommunication (ICACAT), Bhopal, India, 2018, pp. 1-7, doi: 10.1109/ICACAT.2018.8933614.

Rahul Gupta

M.Tech Research Scholar SORT Peoples University Bhopal MP.

Sudhir Goswami²

Assistant Professor Department of Computer Science SORT Peoples University Bhopal MP

Sheetal Gupta³

Assistant Professor Department of Computer Science SORT Peoples University Bhopal MP