Smiley Captcha and Smiley Games Solving Complex Problems

Suhas Aggarwal
suhasagg@gmail.com

ABSTRACT

There is no doubt that Captchas and games can be primary source for useful data collection. These are one of the prominent source of human computer interaction and have become a significant part of ones daily life. In this paper, we discuss several useful features which can be integrated in Captchas and their useful in different domains advertising, analytics, refining data. Features focus on identifying emotions in different categories of media by taking user input, also facial impressions corresponding to the user are identified when they are watching/experiencing media. Apart from this how captcha technology can be beneficial to web audience in different domains such as automated media/knowledge, analytics personalised offers, entertainment, broadcasting useful information.

Keywords

Captcha, Serious Games , recommendation engine, Captchas with a purpose, automated media, personalised content, information broadcast, linked data.

1. Ad Captcha / Analytics Captcha Introduction

Captchas can play a major role in advertising.Users are given a ad capcha and they have to type certain brand keywords which helps in brand recall. Adding visual effects to Advertisement Captcha make them visually appealing which also helos in better brand recall. These Captchas include 3d ad captchas, such as globe, cube captcha which helps make advertisement visually appealing and helps in better brand recall.[19][20] Different mechanism for Captchas has been identified for ad captcha apart from taking text as input. These games can be extremely short games given to user, player can use keyboard controls, say to navigate a 3d world to find answer to the question. Drag and drop Captcha such as toppings to pizza, movie themes- help harry destroy voldemort, help neo fly, leaving agents on the ground, help hbk get the product by climbing ladder in a ladder match against razor ramon. Users are very familiar with these mechanisms as they have become a part of one's daily life and their integration with the product to be advertised makes advertisement really appealing. Also, some important mechanics present in for examples scenes of the movie can be presented as a small game which can really increase movie performance when it is released. Presenting features of the product as a small game develops interest of users towards that product and helps in brand recall.

For example - adding toppings to pizza game, if certain pizza say peppy paneer sold by dominoes is presented and user have to

complete the toppings, it adds a great value to the product and strengthen the bond of users towards that product. Apart from this, users can drag and drop smileys corresponding to advertisement campaign as their response towards campaign which helps in collecting emoticon data for the campaign. Sometimes users are also asked to type context corresponding to their reaction which helps in determining the validity of sentiment. Analytics Captcha helps in sentiment analysis of media in different domains[2]. Emotion is entered after user has gone through the ad after entering brand keyword here 'shoes' to prevent bogus responses.

Figure 1: Sentiment Analysis Image Captcha

1.1 Discussion of security features of Captcha

Captcha hacking is a prominent challenge and breaches can cause a great loss. That's were Random Captcha System comes in play. A Random CAPTCHA problem is given. As CAPTCHAs of different genre are presented randomly, this makes it very difficult to attack these CAPTCHAs. Even if a program is written to attack one CAPTCHA problem, devising an online attack becomes infeasible as after one unsuccessful try, a different random CAPTCHA problem will be presented to the user and attacking program should be capable to solve that as well. This problem, introduces a new problem of identifying CAPTCHAs, before attacking a CAPTCHA, attacking program will have to identify which CAPTCHA, it is as well. So, Captcha Challenges are mixture of Advertisement Captcha, Analytics Captcha, Distored Text Captcha, Entertainment Captcha. This makes launching attack on Captchas extremely difficult. SMILEY Captcha can be combined with reCaptcha to increase the benefit of the system and security. Different Captcha mechanics such as drag and drop,Captcha object control via keyboard keys, clicking on objects in image prevent DOS attack against Captcha Servers.Misspelling words and asking users to type misspelled words prevent against dictionary attacks as users can easily figure out the word with a minute spelling mistake and can answer Captcha correctly.

2. SMILEY CAPTCHA ANALYTICS

a) First layer Captcha

Emotion scale is determined from emotion reaction in first round of captcha run, if a scale can be derived from initial run, Captcha Image is tuned for comprehensive sentiment measurement by asking users to select from sentiment values in existing quadrant. Each emotion value corresponding to different quadrant/different categories of Emotion is placed in Captcha. First primary sentiment/emotion is derived corresponding to campaign by first round of Analytics Captcha run. First round of Captcha runs for a short period of time depending on nature of campaign.

b) Second Layer Captcha.

After deriving primary sentiment for the campaign for the campaign via first layer Captcha, second layer captcha runs which measures degree of emotion in greater depth. For example, if primary sentiment for a shoe sale ad campaign is cool, three positive emo**tions are picked such as cool,** super cool, Magnificent. Captcha Image is tuned for comprehensive sentiment measurement by asking users to select from sentiment values in existing quadrant corresponding to primary sentiment derived.Intent of choosing emotions on a positive scale is to determine, how positive a user is corresponding to campaign to determine whether it will be good or it will be a superhit. Second round of campaign runs in conjunction with first round of Captcha for a long period. Images of people viewing media are also taken via users webcam and their reactions towards media are analysed. Collection of User reactions via webcam acts as double authentication of user reactions on a large scale. Moreover, human recognition acts as another source of authentication for Captcha. Primary Emotions are detected using Neural Networks Implementation in java using Encog Library. Sentiment corresponding to media is also derived by measuring its sentiment from social media tools and then results can be compared from those generated by Analytics Captcha.

Smiley games also work in similar fashion, they ask users and their game partner to type their emotion reaction towards product, this works on the principle that if product is really good, it should be liked with majority of users.

First Layer Captcha

Figure 2

Second Layer Captcha.

Figure 3: 2nd Level Positive Emotion Collection

Drag and Drop Analytics Captcha

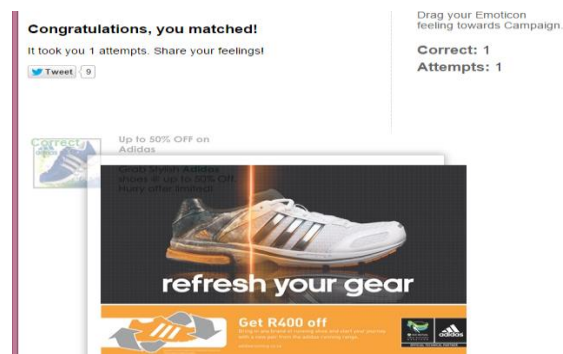Figure 4 : Drag and drop Captcha for sentiment Analysis

Figure 5:Animation Shown to users after solving Captcha

After giving emoticon feedback towards campaign, user can share their feelings on social networks. Benefit of this design is user can see complete campaign in beginning, get information and perform cool drag and drop and get better brand recall.

3. Role of Human Factors in Sentiment Analysis

Human Factors play a very significant role in sentiment Analysis.

Automated sentiment Analysis tools have flaws in below domains. Irony, humor and other subtleties of human speech, like how the emoticon icon smile can change the tone of an otherwise negative statement. Spam-loaded conversations in social media that strike people as inauthentic. False negatives, where the software sees a negative word like "crap" but doesn't realize it's positive in the overall context—"Holy crap! I loved this!"

Cultural differences, where some people from some countries might be more or less effusive in their use of language.

Human can aid in identifying spam. How they can do fine grained emotion Analysis. As can be seen, complete emotion tag, depicting each level in emotion scale can be generated via human computation.Going beyond the polarity of "positive" and "negative" to classify sentiment, and using more fine-grained categories like "angry," "happy," "frustrated," and "sad." are features which automated tools find difficult to implement.

4. Layers of Advertising

As IP Addresses of users are collected when they type their response to Analytics Captcha. These IP Addresses can be analysed with maxmind databases, to give opinions of users about the ads based on geography of users. Based on the response of users, if the same user tries to fill Analytics Captcha based form. Depending upon first/previous response of users, question which is asked from revisiting user to fill Captcha based form can be changed and more comprehensive question in context of same ad campaign can be asked from the user In case of Analytics Captcha, campaigns can be created in following manner. Campaigns with different level of questions based on user responses in successive visits which advertiser needs can be set up when creating a campaign Successive User opinion collection is a strategic way to re-target consumers that can be successive steps after opinion based advertising. This form of messaging allows the advertiser to choose which ads will be the most beneficial to serve in a given order or given some previous interaction with the brand / opinion collected with the user. It's a great way to move people from awareness to consideration as well as increase the efficiency of creative. Ad creative plays a major role in getting consumers to interact with the brand. Successive User opinion collection help ad media reach right audience, thus increasing its efficiency.
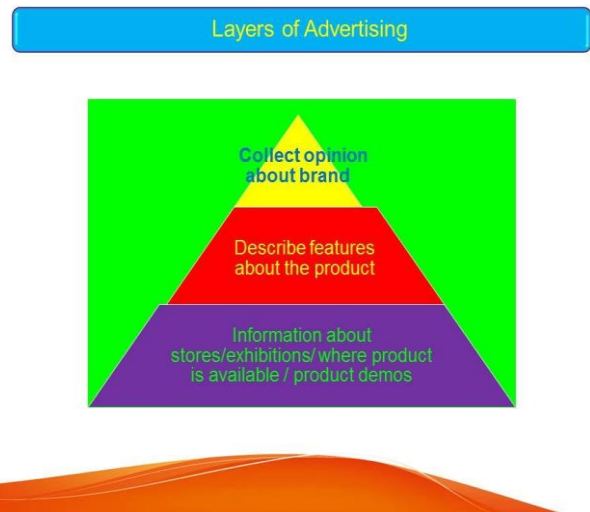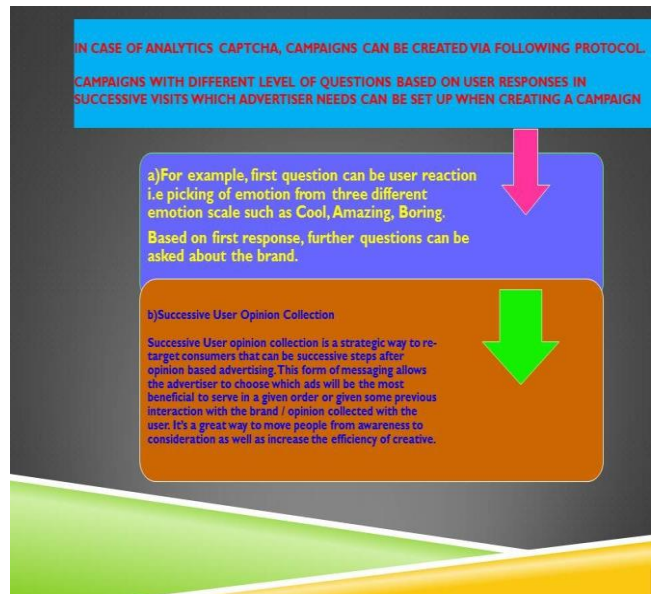

Figure 6a: Layers of advertising

Figure 6b.

Example -

a) First Round of Comparsion.

Question asked about how user feels about coke life say as compared to an earlier or different variety.

b)Second Round of Comparison with more varieties.

Questions such as which flavour is favourite and would like to use on regular basis.

c) Third round of Advertising.

User can be given demo information about the product and demo of product can be given to the users who have shown considerable interest in the product.

While giving demo of product to a person who has shown considerable interest in the product, a small incentive can be provided to him, if user is willing to spend some effort to make it

popular in his friends community like repeated sharing of advertisement on facebook and other social networks and increasing like quotient of advertisements.

If demo is not possible, a surprise discount coupon can be given to the user, giving user incentive to buy the product.

5. Story Mode of Captcha

Advertisers can create stories which will be shown in sequence to users.Complete story can be shown in a single go via animated gif or in parts by advertisers. Comprehensive story mode in games where large number of images can be shown in one go. Retargeting users who have seen campaign earlier.

6. Smiley Games having diverse Applications

How smiley games help to collect data, it can be used for emotion verification for smiley games, if enough emo-tags have been generated that they have become off-limit words. They can be used for verification. Games can be more useful. 'N' Layer of advertising can be present in games. In a multiplayer game, entire story can be embedded in a single session of game. When player and his/partner see entire story of product say pepsi via sequence of images/video, it fosters discussion about the brand and increase interest of users towards the brand. Smiley games is a powerful medium for showing story of campaign/brand in a single go. In very short period/ one game session, player and his partner can learn completely about the brand. How it aids in getting interested users and mutually helps both brands and users. Games serve as a powerful medium for educating users about a topic short period of time, be it an advertisement, a news story, collection of art from an artist. As game used graphic as display units, it acts a powerful medium, as users learn better via graphics. Also, multiplayer interaction towards graphic unit helps develop mutual interest and brand recall. This also helps in monetization of portals which are hosting smiley games. Games and Captcha can also collect voice data for interested players, web audience who want more participation.
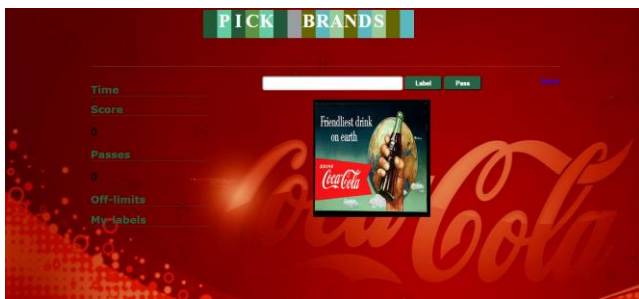

Figure 7: Pickbrands game displaying ad to users

Other application of Smiley games can be generating linked data.[18]. How a song of a movie can be related to a news story can be a really interesting relationship to look at. User has to do four non empty submissions to move to next media, one is Tag, other is emotion reaction, Third is the url of linked media, Fourth is contexual relationship between media object and url of media entered. Tag and user reaction helps to validate user viewed the media with considerable interest and acts as a ranking criteria for derived links.

Moments play a very significant role while watching a movie/tvserial/advertisement/news article/sports. There are some exclusive cool snippets which one would like to enjoy with others or in a group but sometimes is not able to do. Currently, major media houses such as Youtube, Internet TV enables user to view selective precious moments in media but they don't enable one to enjoy and relive the moments in pairs in a realtime manner.Smiley games show precious moments to a pair of players, and if their emotion scale is mutually common, response is collected. This help in living precious moments together, player and his/her partner can see each other in webcam and can speak with each other to add to enjoyment. This enable to relive the moment together and recap of precious moments which strengthens the bonds of user towards high quality media and prevents boredom.

Figure 8 : Generating Linked Data

Figure 9: Watch WWE Moments in Pairs with an online Partner

7. Campaign/Media recommender for campaigns and Campaign retargeting

Campaign media recommender uses keyword tags and emotion tags given by the user to the media to generate personalized recommended media. Campaign solr documents with these fields are indexed in Apache Solr and for generating personalised recommendations, Advanced story campaign mode takes campaign keywords, user feedback into account, so that campaigns which are liked by user, campaigns of similar genre in existing inventory are shown to the user to increase campaign serve efficiency. Algorithms for serving Captcha Ads include immediate feedback towards campaign from the users,if Analytic Campaign has received high number of dislikes from the users on a large volume in short period, immediate results are shown to the advertiser to start another campaign which ask user for detailed feedback towards campaign so that these suggestions can be incorporated. For deriving unique users, ip address of users,o perating system of users are taken into account. Geo-Targeting campaigns via maxmind database, enable selected targeting of ads to customers..

Figure 10

If user enters positive emotion towards ad campaign, he/she sees similar campaigns as Captcha.

Figure 11: Similar content recommendation

8. SMILEY Captcha - An integral part of Social Media Conversion Architecture

Captchas are integral part of ones life, these days, one encounter Captcha during routine activities such as posting comments, logging to different websites.

1)Smiley Captcha presents user with media in different domains, these different media objects include Advertisements, News, Art ,Places, Entertainment Media such as movie trailers. Thus, it helps in creating awareness of media.

2)Smiley Captcha also help users to share different Media objects on social networks such as facebook, twitter, google plus and hence leads to social amplification.

These actions lead to website visits consideration and hence, drive sales and revenue.

9. Increase Virality of campaigns using Smiley Captcha

When a topic is posted in twitter or facebook and is receiving lots of positive response on social media such as twitter or facebook. If that topic is presented as SMILEY Captcha, it can get further responses from the web audience, and thus lead to social amplification, virality of campaign. There may be a case when, user could not tweet or post on facebook about an event due to busy life but as Captcha are integral part of ones daily life, user can post his response, emotion towards topic as A Captcha response.Moreover, he/she can post it on facebook. Smiley Captcha is an automated way to be aware of different media content for the web audience, they don't have to search for the popular topics, smiley captcha does that for you,one can get a latest hot topic in form of a Captcha and Users can post their response for the same.
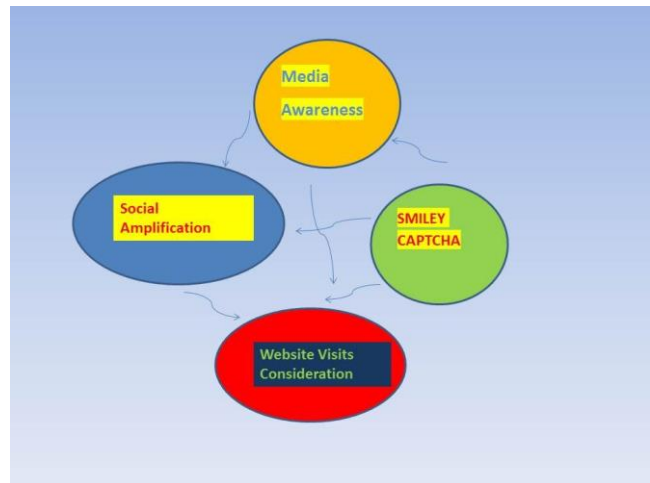

Figure 12

10. Broadcast Information using Smiley Captcha.

Smiley Captcha can be used to broadcast useful information which should be conveyed to majority of population. For example , missing child information which should be conveyed to large amount of population. Here is example of broadcasting Using smiley Captcha.
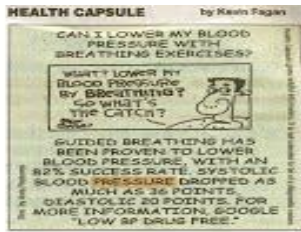

Figure 13

11. Smiley Captcha Graphics is beautiful and beneficial

Earlier captcha graphic was ugly and not liked by people and people found it annoying. Smiley Captcha graphics are beautiful, easy and not annoying. These captchas are beneficial for users, provide useful information. Users get these information in an automated way while doing their routine activities, information can be in domain of entertainment, health capsules, latest online shop offers , product discounts which users will surely love and benefit from. Moreover, type some information it helps in brand recall and they remember information which is useful for them.

Figure 14:Benificial and beautiful Captchas

(ii)

(iii)

12. Relive Precious Moments

Captchas capture precious moments from television serials, other media and ask them to solve puzzle corresponding to the same which help users to relive that precious moment and recall it as well and thus, boost their interest in media.

Figure 15

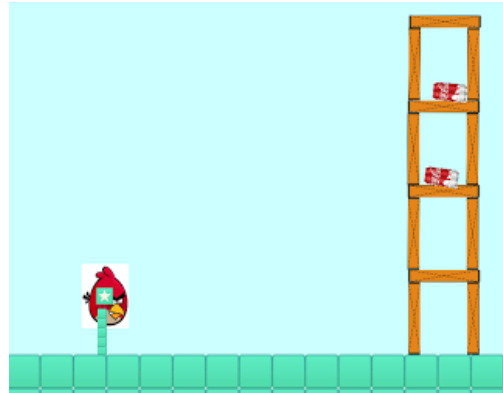## 13 Different Game Mechanics for Developing Capchas which develop interest in users.
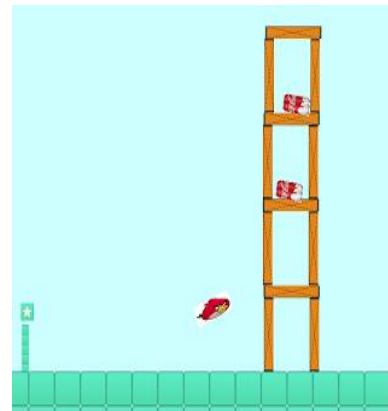

Figure 16a – Aim bird to obtain coke cans

Figure 16b – Bird being shot

Aim of this game is to shoot bird such that structure dismantles and coke cans fall to the ground.
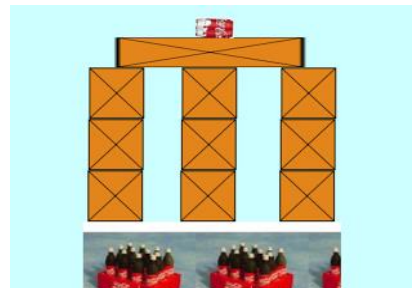

Figure 17: Destroy blocks such that coke can does not falls off .

Figure 18: Simulation of Coke vs Pepsi war mini game

Above examples show implementation of physics based Captcha.

DEMO
For demo of system, please visit –
www.smileycaptcha.com,
www.smileysmileygames.com

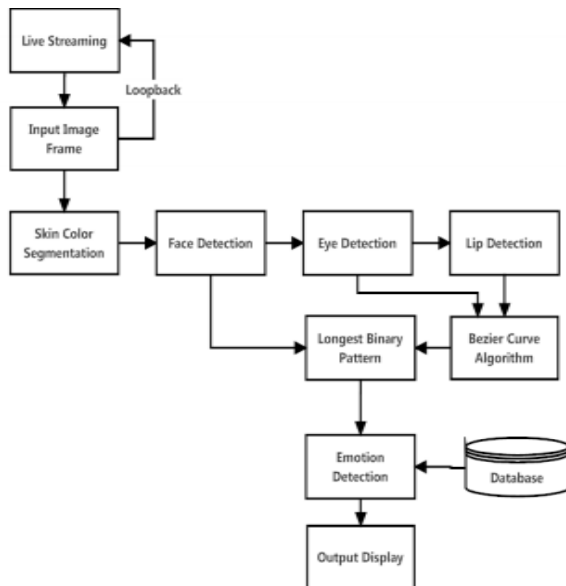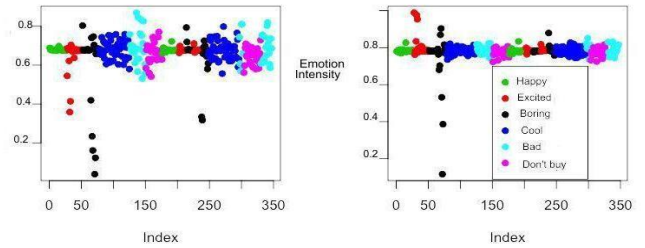**Appendix**

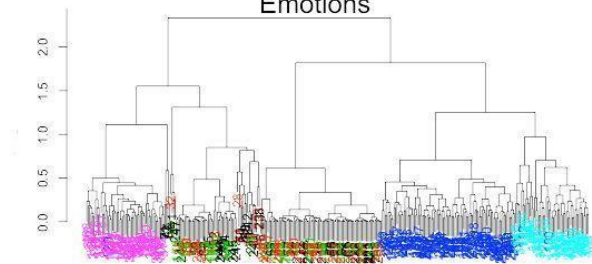Figure 19: Facial Expression recognition

Figure 20

Figure 21

Architecture for efficient Captcha/Game Server Implementation

Functioning of Smiley Captcha System -
Core functioning and architecture of system. is given below -

Brief summary of database schema -
There are mysql tables for following -

Channel - Depending on domain of campaigns, channel had categories, there can be channels corresponding to different domains such as gaming,news,entertainment,technology,

Publishers - Different publishers can pick different channel corresponding to their domain such as corresponding to news portal channel can be of category news, corresponding to movie trailers , channel can be entertainment.

Advertiser - Advertiser can create different campaigns.

Campaign - Properties of Campaign - Campaign has different fields such as advertisments(ad-ids) mapped to the campaigns, status such as expiry date, run duration (from date - till date), Charging metric - CPC (Cost per clicks), CPM(Cost per 1000 impressions), countries where campaign is targeted.

Advertisement - Each Advertisement loaded corresponding to the campaign has id and properties such as media type, media type can be image, video.

Impression Measurement System

Daily Impression Statistics Table - According to the hour of the day, impression data corresponding to campaign is present in this table.

Aggregated Impressions Table - Aggregated table that contains, impressions for the day – so that impressions can be grouped by day for campaigns.

Aggregate channels Table - which contain number of impressions per day corresponding to channels and corresponding campaigns. Table also contains entry for country, device so that impressions can be grouped according to device and country.

Query Log table - Each mysql command to insert data in mysql tables is recorded in query log table to figure out bug in the system.

Geography table - contains country, state codes mapping.

For multiple layer Advertising Captcha, There are certain measures defined for each user response.

For example –
layer 1 response has measure - sentimentresponse1
layer 2 response has measure - sentimentresponse2
layer 3 response has measure - sentimentresponse3
and similarly ahead.

Tracker system-
Trackers are used to collect data and record impressions.
Tracker are executed when user views ad videos, ad images.
There are trackers corresponding to different stage of video viewing, when video starts,25% video has played,50% video has played, 75% and so on.
Various trackers are executed when user clicks on different object in the advertisement media.
Trackers are executed when user drags and drop the advertisement object in drop zone.
Sample tracker urls are below -
http://serve.smileyCaptcha.com/adserver/tracker.php?m=vi;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

http://serve.smileyCaptcha.com/adserver/tracker.php?m=vi_25;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

http://serve.smileyCaptcha.com/adserver/tracker.php?m=vi_50;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

http://serve.smileyCaptcha.com/adserver/tracker.php?m=cl;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

http://serve.smileyCaptcha.com/adserver/tracker.php?m=drd_0;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

http://serve.smileyCaptcha.com/adserver/tracker.php?m=drd_e;ci=27591;ai=220575;chid=3329;ou=rd;rand=[timestamp]

Trackers corresponding to different layers of advertising are as follows-

Layer 1 Tracker Data
----
1)http://serve.smileyCaptcha.com/adserver/tracker.php?m=srl1;ci=27591;ai=220575;chid=3329;uresponse=userResponseData1;ou=rd;rand=[timestamp]

Layer 2 Tracker Data
----
2)http://serve.smileyCaptcha.com/adserver/tracker.php?m=srl2;ci=27591;ai=220575;chid=3329;uresponse=userResponseData2;ou=rd;rand=[timestamp]

Layer 3 Tracker Data
----
3)http://serve.smileyCaptcha.com/adserver/tracker.php?m=srl3;ci=27591;ai=220575;chid=3329;uresponse=userResponseData3;ou=rd;rand=[timestamp]

Here is explaination of different tracker measures -
m stands for measure,vi,vi_25,vi_50 corresponds to impressions received at different stages of advertisement/media views.
ci stands for click tracker, clicks are recorded corresponding campaign, when user click on valid clickable object. In order for captcha to solve user has to click on clickable object. drd_0 stands for drag and drop tracker, drag started and drd_e stands for object has been dropped in drop zone. In order to solve drag and drop, user has to drop valid object in drop zone.
srl1 stands for sentiment response layer1, srl2 stands for sentiment response layer2, srl3 stands for sentiment response layer3. User response stands for different emotion response user enters in Analytics Captcha.
ci refers to campaign id, ai refers to advertisement id, corresponding to one campaign, there can be multiple ad units corresponding to campaign, chid refers to channel-id form which ad requests have come.

Apart from these, there are third party trackers, publisher trackers, these trackers are used such that publishers can get statistics directly, third party tracker numbers are for verification of publisher and smiley captcha tracker information, in case of any disputes in impression counts, third party tracker information can be used to verify impression information obtained from trackers for billing.. Impression data received is migrated from mysql databases used by serving machines to google big query, which can be used for generating reports such as Impression reports by country, device, time, engagement reports. Hourly impression data recorded in mysql is split into small chunks 5 minute files and then data is uploaded to google cloud from where it is uploaded to big query tables. Schema for aggregation tables which contain impression data in mysql, daily stats, aggregate channels, aggregate ads is same.

Alerting system
As there can be aggregation failure corresponding to different stages in aggregation process, such as there is bug in uploading data from mysql to google cloud from where data is uploaded to google big query. There can be errors due to bugs in data format while recording data which can result in bugs in uploading data to big query. Alerts are there corresponding to each stage, when upload to google cloud fails or when big query load job fails. disk space limit exceed errors. There is Alert corresponding to each of the bug.

References

[1]Von Ahn, Luis. "Games with a purpose." *Computer* 39.6 (2006): 92-94.

[2] Von Ahn, Luis, et al. "CAPTCHA: Using hard AI problems for security."*Advances in Cryptology—EUROCRYPT 2003*. Springer Berlin Heidelberg, 2003. 294-311.

[3] Luis von Ahn, Ben Maurer, Colin McMillen, David Abraham and Manuel Blum. reCAPTCHA: Human-Based Character Recognition via Web Security Measures. Science, September 12, 2008. pp 1465-1468

[4] http://www.solvemedia.com

[5] http://areyouahuman.com/

[6] http://www.adscaptcha.com/

[7] http://www.nucaptcha.com/advertisers

[8] http://www.gwap.com/gwap/

[9] http://www.atelier.net/en/trends/articles/gamified-captchascan-benefit-both-brands-and-users

[10] http://www.indiadigitalreview.com/features/catching-tgthrough-captcha
[11] http://thenextweb.com/media/2011/10/06/solve-medias-smartcaptcha-ads-improve-brand-recall-by-67/

[12] http://www.brandchannel.com/features_effect.asp?pf_id=145

[13] Smith, J. H., & Just, S. N. (2009). Playful Persuasion. *Nordicom Review*, *30*(2), 53-68.

[14] Winkler, T., & Buckner, K. (2006). Receptiveness of gamers to embedded brand messages in advergames: Attitudes towards product placement. *Journal of Interactive Advertising*, *7*(1), 37-46.

[15] Svahn, M. (2005, November). Future-proofing advergaming: a systematisation for the media buyer. In *Proceedings of the second Australasian conference on Interactive entertainment* (pp. 187-191). Creativity & Cognition Studios Press. http://dl.acm.org/citation.cfm?id=1109180.1109210

[16] Diakopoulos, N., Luther, K., & Essa, I. (2008, October). Audio Puzzler: piecing together time-stamped speech transcripts with a puzzle game. In *Proceedings of the 16th ACM international conference on Multimedia* (pp. 865-868). ACM. http://dl.acm.org/citation.cfm?id=1459507

[17] Cauberghe, V., & De Pelsmacker, P. (2010). Advergames. *Journal of Advertising*, *39*(1), 5-18.

[18] http://linkeddata.org/

[19]Aggarwal, Suhas. "CAPTCHAs with a Purpose." *Workshops at the Twenty-Sixth AAAI Conference on Artificial Intelligence*. 2012.

[20]Aggarwal, Suhas. "Animated CAPTCHAs and games for advertising."*Proceedings of the 22nd international conference on World Wide Web companion*. International World Wide Web Conferences Steering Committee, 2013.

[21] Aggarwal, Suhas. "Applications of games with a purpose." *Computer Games: AI, Animation, Mobile, Interactive Multimedia, Educational & Serious Games (CGAMES), 2013 18th International Conference on*. IEEE, 2013.

[22] Collaborative filtering CAPTCHAs. M. Chew and J. D. Tygar. In Human Interactive Proofs: Second International Workshop (HIP 2005) , eds. H. Baird and D. Lopresti, Springer, May 2005, pp. 66-81.

[23] Luis von Ahn, Shiry Ginosar, Mihir Kedia and Manuel Blum. Improving Accessibility of the Web with a Computer Game. ACM Conference on Human Factors in Computing Systems, CHI Notes 2006. pp 79-82.

[24] Luis von Ahn, Mihir Kedia and Manuel Blum. Verbosity: A Game for Collecting Common-Sense Knowledge. ACM Conference on Human Factors in Computing Systems, CHI Notes 2006. pp 75-78.

[25] Luis von Ahn, Ruoran Liu and Manuel Blum. Peekaboom: A Game for Locating Objects in Images. ACM Conference on Human Factors in Computing Systems, CHI 2006. pp 55-64.

[26] E. Cambria, D. Rajagopal, K. Kwok, and J. Sepulveda. GECKA: Game engine for commonsense knowledge acquisition. In: AAAI FLAIRS, pp. 282-287, Hollywood (2015)

[27]E. Cambria, Y.Q. Xia, and A. Hussain. Affective common sense knowledge acquisition for sentiment analysis. In: LREC, pp. 3580-3585, Istanbul (2012)