

DEVELOPING A SELECTIVE AD-BLOCKING TOOL

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Bell Labs, India

Overview

- Online Behavioral Advertising (OBA) and Third-party tracking
- User Study
- Existing ways to control OBA
- Ad-filter Tool

Motivation

- Current blocking tools like Ad-block Plus (ABP) block all ads
 - ▣ Disadvantage to advertisers, publishers, users.
- People report to be using ABP with the motivation for blocking annoying and embarrassing ads.
- Understand user perceptions on this issue in India which has been explored only in the context of Western cultures till now.

Objectives

- Understanding attitudes of users in India towards sensitive online ads through a user study.
- Developing a selective ad-blocking tool- Filter ads with sensitive and inappropriate content only in contrast to blocking all ads.
- Preventing tracking of user's online behavior on such websites.



Online Behavioral Advertising and Third-party tracking

Online Behavioral Advertising (OBA)

- A set of activities ad-networks engage in to
 - ▣ Collect information about users' online activity
 - ▣ Deliver relevant ads based on user's browsing pattern.
- Pay for fewer impressions of their ads- Enjoy higher click-through rate and a higher conversion rate.
- Only 8% of all online advertising is behaviorally targeted*.

*Source: *Search Engine Watch*

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Third Party Tracking

- Practice by which third parties assists in tracking user's visits to different websites.
- Larger the browsing profile collected, better the service it can provide.
- Third parties include
 - ▣ Advertising networks (DoubleClick - 40%*)
 - ▣ Analytics companies (Google Analytics - 50%*)
 - ▣ Social Networks (Facebook- 30%*)

*Src- Data is for the top 500 popular sites according to Alexa rankings.



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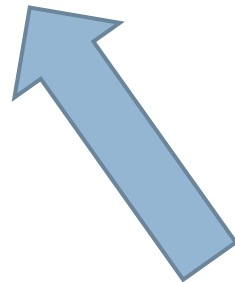
0 ▾


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0 ▾



3rd party





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Depart on
 30/4/2013

My dates are flexible (for travel within India)

Adults (above 12 yrs) Children (2-12 yrs) Infants (under 2 yrs)

1 0 0

User ID	Websites visited
22d08c7166	cleartrip.com



3rd party



Name- id
 Content- 22d08c7166
 Domain- .doubleclick.net

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3rd party



Name- id
 Content- 22d08c7166
 Domain- .doubleclick.net

Data collected


- No personal information (name, phone number, address) is collected.
- Analysing patterns of online activity allows inferences about the user.
- Pages a user visits can reveal their location, interests, purchases, employment status, sexual orientation, financial challenges, medical conditions etc.

Unethical Tracking Practices

- Mayer and Mitchell found that advertising networks (Epic Marketplace) and websites (OkCupid) were selling data about users which included topics like menopause, getting pregnant and debt relief or how often a user drinks, smokes.
- Krishnamurthy et al. found that a third party learned of the user's query 90% of the time when they tested search queries on ten popular health websites.
- On interacting with 120 popular sites, he also found that that an aggregate of 48% leaked a user identifier in a request-URI or referrer.

<http://www.photogrfx.net /Albums/TGM/TGM222.html ?user=jimmyjohn>

Current Policies on tracking

- In 2010, United States Federal Trade Commission (FTC) proposed a “**Do Not Track**” mechanism.
- The online advertising industry- Network Advertising Initiative (NAI), Digital Advertising Alliance (DAA) and the Interactive Advertising Bureau Europe, IAB allow users to **opt out** of behavioral advertising by displaying an opt-out icon  alongside an ad.

Opt-out Mechanism

ADVERTISEMENT



The advertisement features a blue background with white text. At the top left is the logo for '.pw the professional web', where the dot is a white tie. Below the logo, it states '90+ Registrars Accredited already' and 'Sunrise Ends ~~9th Feb~~ 15th Feb'. A dark grey button with white text says 'Get Accredited'. In the bottom left corner, there is a 'g +1' icon with a close button. In the top right corner, there is a small red-bordered box containing a white triangle icon, which is the opt-out mechanism.

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90+ Registrars Accredited already

Sunrise Ends ~~9th Feb~~ 15th Feb

Get Accredited

g +1 ×



User Perception about OBA and third-party tracking

What does past research study say?

- Past user surveys indicate that although some users find OBA useful, the general public attitude towards it is negative and people are deeply concerned about their online activities being tracked by web third parties.
- A 2012 survey by Pew Research found that 68% of respondents were “not okay” with behavioral advertising.

User Study

Conducted in-depth interviews with 57 web users in India to understand their perceptions of OBA and third-party tracking.

Our user study

- Our study tries to re-investigate this issue in the context of a non-US audience.
- We study user attitudes towards tracking and OBA within the larger framework of user perceptions of ads.
- We focus on other issues as well in online advertising which have been completely overlooked in the academic literature on ads.

Questionnaire

- Gauged users' overall perception of ads and sensitivity of ad-content
 - View ads? Click on ads?
 - Experienced any embarrassing ad?
 - What kind of ads do they find sensitive?
 - On what kind of websites have they observed such ads?
 - Are these ads more embarrassing at work than at home?

Questionnaire

- Asked them on their requirements of ad-blocking tools.
 - ▣ Aware of Ad-block plus (ABP) or any other ad blocking tool?
 - ▣ Would they like to use ad blocking software? Why or why not?

Demographics

	Females	Males
Gender	29	28
Avg. no. of hours spent online per day	3.2 hours	3.5 hours
Notices ads	89%	55%
Click on ads	67%	37%
Purchased from an ad	17%	11%

Concerns about third-party tracking

- Participants had a neutral attitude towards third-party tracking with only 25% of participants opposing the idea.
- Their fears basically revolved around-
 - ▣ Lack of transparency in the data being collected
 - ▣ Selling of data to other parties for marketing calls or other purposes

“If they can track what I am browsing, maybe they can keep tab of the information that I give out on those sites.”

Concerns about third-party tracking

- Majority didn't want to be tracked on email and banking websites, financial investments and adult content websites.

“I don't want to be tracked on my personal things (places where I log in or do transactions). Everything else is fine.”

- Some people even liked the idea of third-party tracking and found it useful.

Perception about OBA

- Around 83% of the participants had experienced behaviorally targeted ads.
- More than 75% of them would like to view such ads.
- Wanted ad-categories were travel and tourism(66%), apparel (51%) and Arts and entertainment (49%).
- Least desired categories were Sex-related ads (60%), Get-rich-quick ads (55%) and Religion (43%).

Concerns about OBA

- Participants attitude towards OBA was more positive than that towards third-party tracking.
- Concerns related to OBA basically revolved around
 - ▣ Repetitiveness of such ads (70%)
 - ▣ Leaking private information to proximal users. (28%)

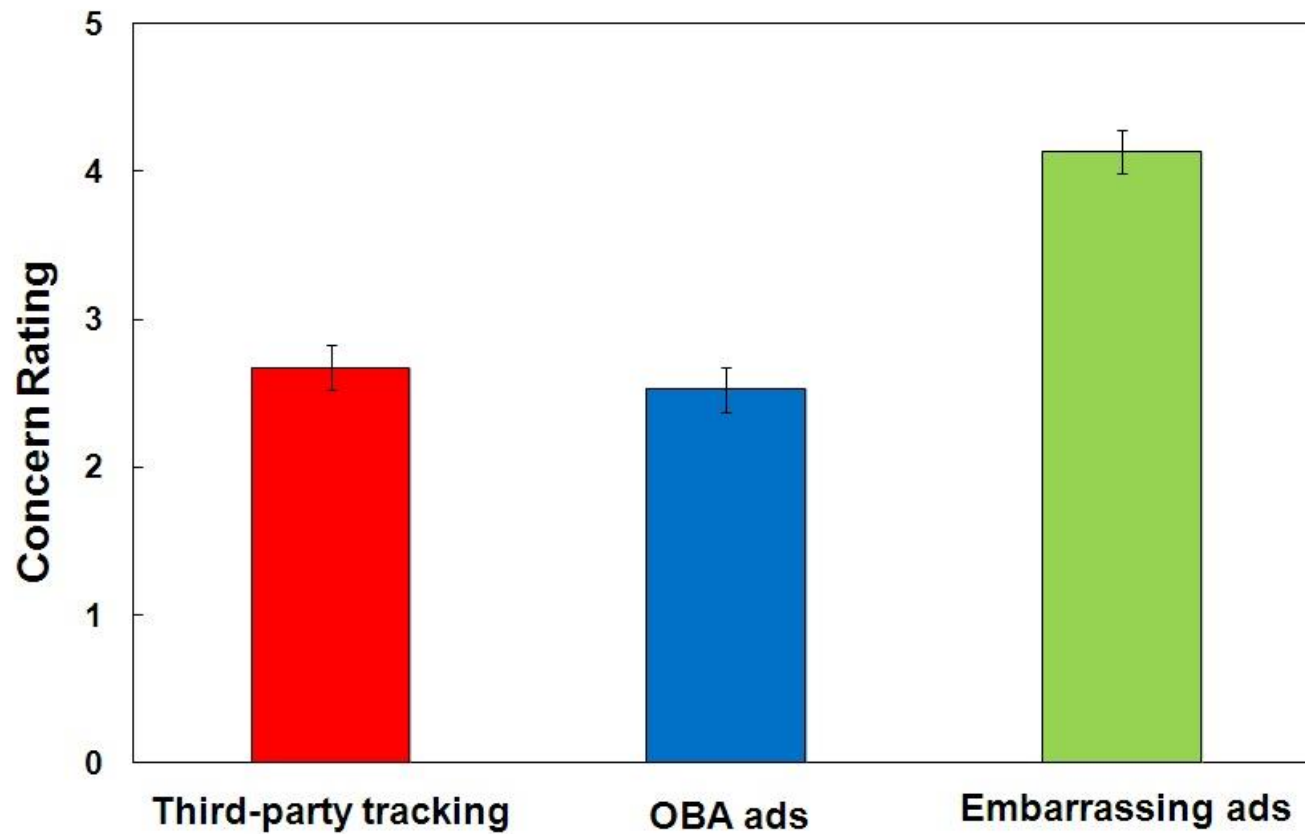
*“I remember Jabong was there all the time.
I purchased something from that site.
Then that Jabong ad kept coming whichever site I visited.”*

Concerns about Embarrassing Ads

- Majority of our participants (42/57, i.e. 74%) had experienced situations in which they were shown online ads which they perceived as carrying embarrassing content.
- Defined embarrassing ads as graphic ads that either contain sexually explicit content, dating ads or else a display of swimwear or lingerie.

“When I watch online movies, the movies open in a pop-up player of a third party. They show ads of scantily clad women. I was watching it with my mom [once] and it became pretty embarrassing.”

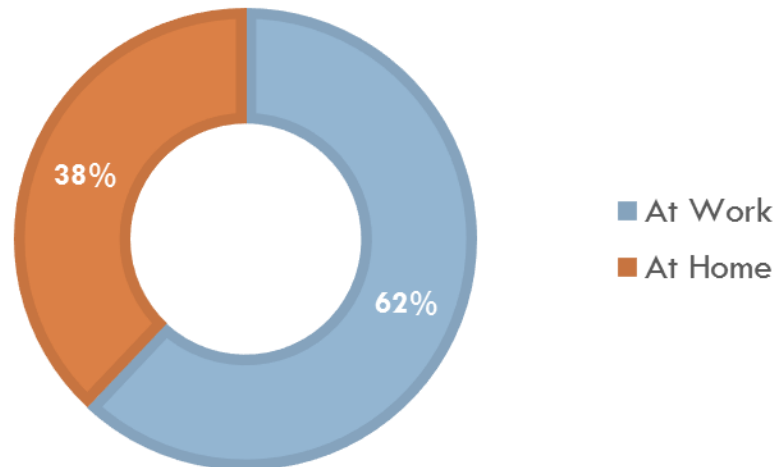
Concern Rating



Embarrassment via social context

- Majority reported instances in which the embarrassment was caused by being in the vicinity of other people.

SOCIAL CONTEXT



Examples of Embarrassing ads

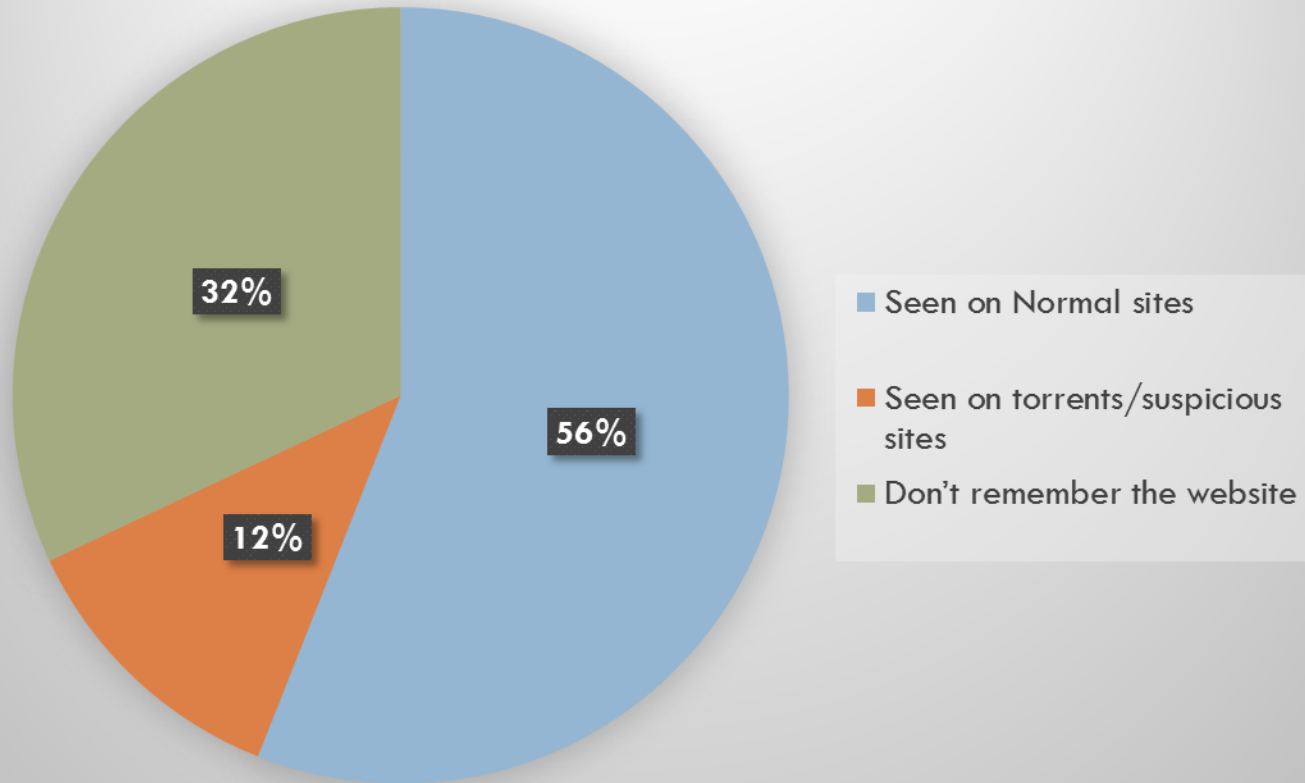


DATING ADS



MATRIMONY ADS

Type of website on which embarrassing ads were seen.



Perceptions regarding Ad-Block Plus

- Majority (62%) expressed an interest in using a tool like Ad-block Plus which also allows selective blocking of ads.
- 2 participants were explicit in stating that their main motivation to use the tool was to eliminate embarrassing ads.
- Some wanted to use it only in some situations (e.g., only at work) but not others.



Ad-Extraction Tool



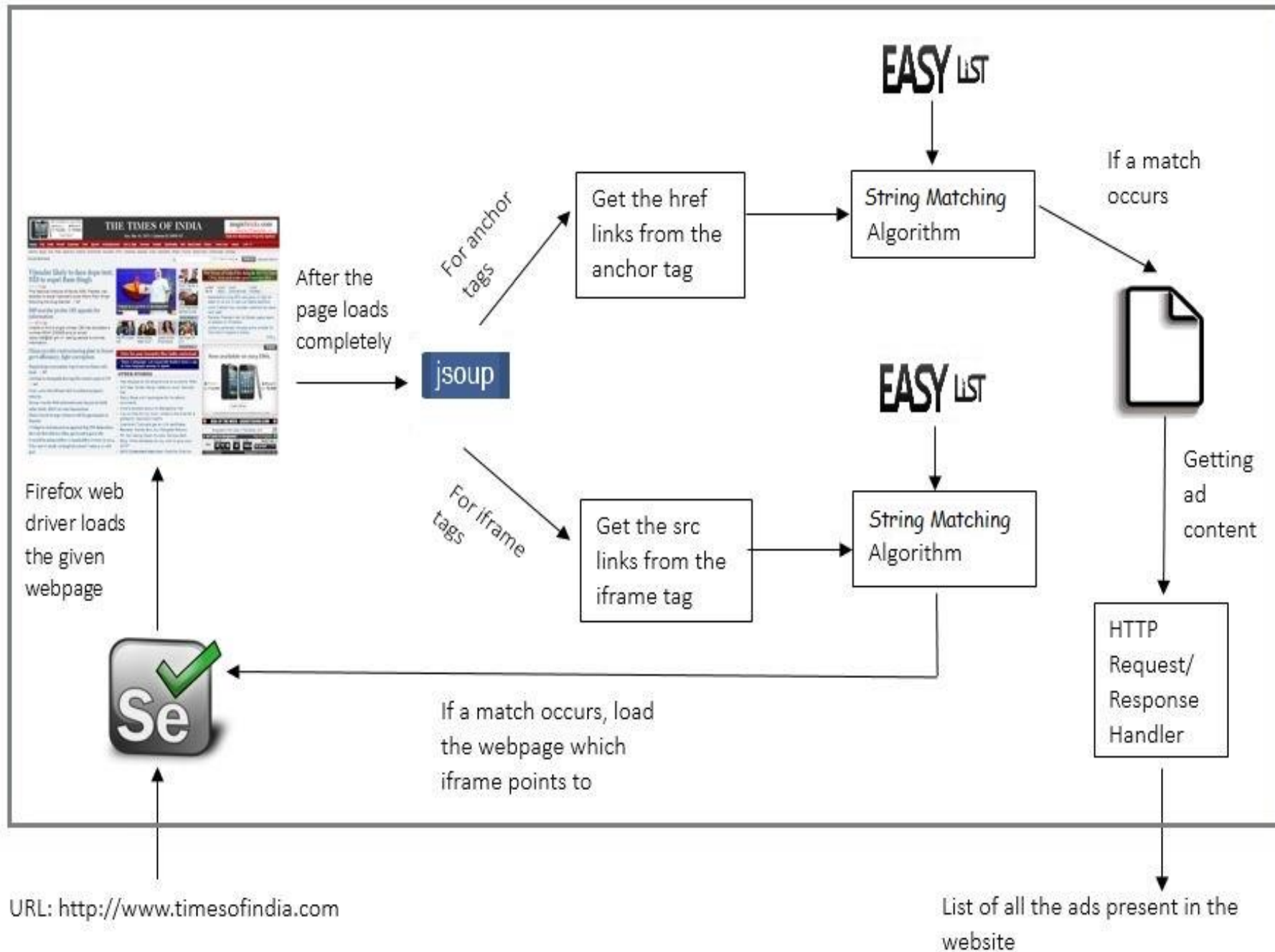
Objectives of the tool

- Extract ads from given webpages and identify the content of the ads to check if the ad contains inappropriate content or not.
- We ran this tool on three different set of webpages containing 500, 2500 and 5000 URLs respectively collected from user's browsing history during the user study.

Tools Used



EASY LIST



Data collected

- Ad-Title
- Ad-Content
- Ad-Display URL
- Ad-Source URL
- Landing Page Title
- Landing Page URL
- Image Source
- URL of the main page
- isThirdParty?
- isIFrame?



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```
<a href="http://www.googleadservices.com/pagead/ac1k?sa=L&ai=CakYznLt2UZf6B0a-i...ource%3Dgoogle%26utm_medium%3Dcpc%26utm_campaign%3Dremarketing-blr-del-txt" target="_blank" style="font-family:georgia;font-size:16px;color:#024D99;font-weight:bold;" onmouseover="window.status='Via.com/Bangalore-Delhi-Flights';return true" onmouseout="window.status='';return true">Bangalore to Delhi @ 4499</a>
```

Results

Data Set	Text Ads	Embarrassing Text Ads	Image Ads	Embarrassing Image Ads
Set 1 (500 URLs)	192	4	156	5
Set 2 (2500 URLs)	1235	29	742	16
Set 3 (5000 URLs)	2587	40	1423	30
Total	4014	73 (2%)	2321	51 (2%)

Embarrassing Ads

Text Ads

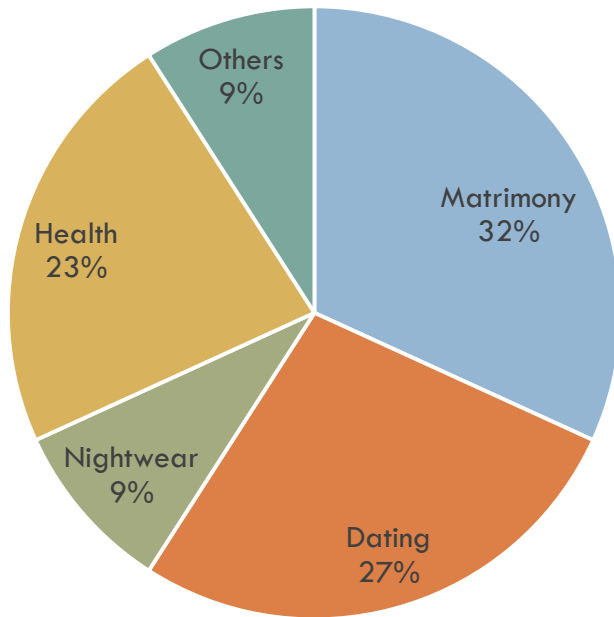
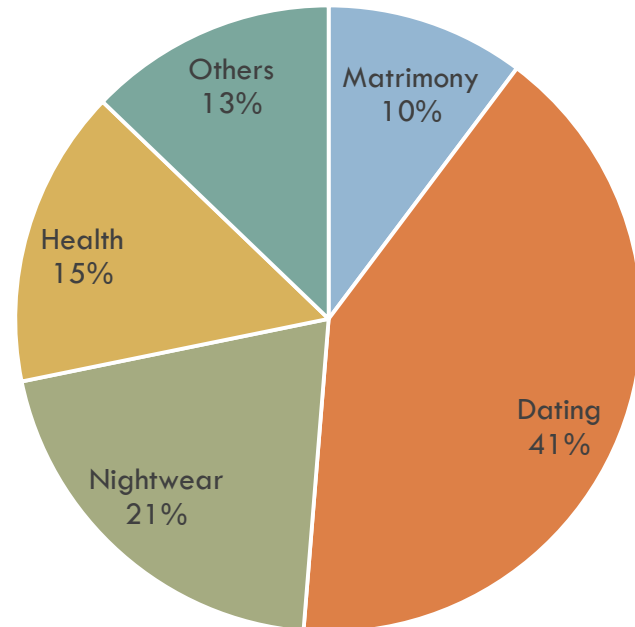


Image Ads



■ Matrimony ■ Dating ■ Nightwear ■ Health ■ Others

■ Matrimony ■ Dating ■ Nightwear ■ Health ■ Others



Ad-blocking tools



Ad-Block Plus (ABP)

- ABP is one of the most popular ad blocking extension available.
- People report to be using it with the motivation for blocking annoying and embarrassing ads.
- Only 25% users report that they want to view zero ads. (Source: ABP website)
- It blocks all ads including textual, image, flash ads using a list of filters.

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<iframe allowtransparency="true" title="Advertisement" align="center" scrolling="no" frameborder="0" vspace="0" hspace="0" marginheight="0" marginwidth="0" height="60" width="150" src="http://netspiderads2.indiatimes.com/ads.dll/getad?slotid=36441" id="fr36441" name="fr36441">
#document
<html>
<head>...</head>
<body leftmargin="0" topmargin="0" marginwidth="0" marginheight="0" bottommargin="0">
<a href="http://netspiderads2.indiatimes.com/ads.dll/clickthrough?msid=19031243&cid=43294&slotid=36441&nsRndNo=1648309066" target="_blank">

</a>
</body>
</html>
</iframe>
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How does it work? (with ABP disabled)



1) HTTP Request to <http://netspiderads2.indiatimes.com>
to load the iframe

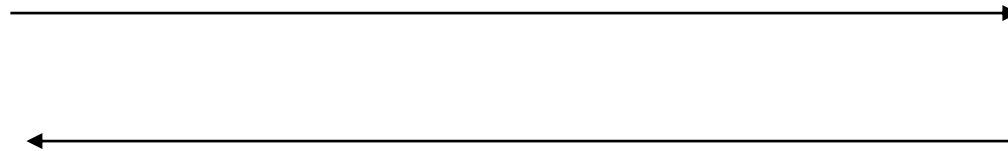


2) HTTP Response to load the iframe

Server- indiatimes.com



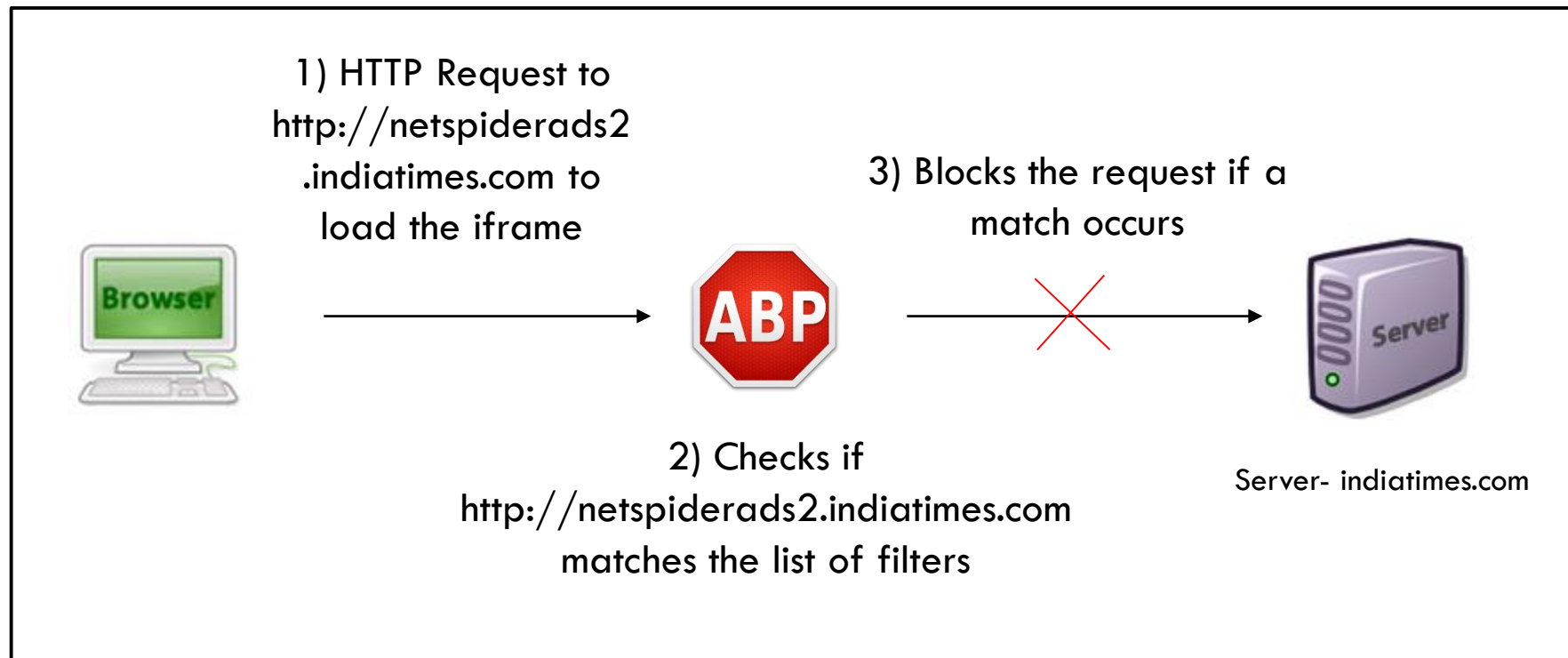
3) HTTP Request to
<http://adscontent2.indiatimes.com/photo/19031.cms>
to load the image inside the iframe



4) HTTP Response to load the image inside the iframe

Server- indiatimes.com

How does it work? (with ABP enabled)



Limitations of Ad-Block Plus

- Doesn't allow selective filtering of ads.
- Blocking of all ad could be serious disadvantage to the parties involved.
 - Advertising companies wont be able to advertise their product.
 - Publishers who rely on ad for revenue may terminate their services or they may start charging users for their service.
 - Users will not be updated about the new products/offers available.

User perception regarding ABP

- Participants favored the idea of Adblock Plus but a few were also unhappy by its inability to block selective ads.
- Only 3 participants in our sample reported to have used the tool prior to the study.
- Amongst the remaining, the majority (62%) expressed an interest in using the tool.
- 2 participants were explicit in stating that their main motivation to use the tool was to eliminate embarrassing ads.
- 8 out of the 15 participants did not want to use the tool because it doesn't provide topical preferences.

Ad-Filter Tool

A modified version of the Ad-block plus tool blocking only embarrassing ads.



Objectives of the tool

- Selective Ad-blocking- Filter ads with only sensitive and inappropriate content in contrast to blocking all ads.
- Allow third-party control on sensitive websites.
- Provide users an option to add an embarrassing ad to the filter list for future blocking.

Modifying Ad-block plus code

- ABP blocks an ad without looking at the content of the ad.
- Modification required to block the ad based on its category.
- Used the filter list created to identify such ads.

How does ABP work?

- ABP intercepts the HTTP requests being sent to the server by the browser.
- It matches the source address of the HTTP request to a list of filters to decide if it should be blocked or not.

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    </a>
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to load the image



Server- indiatimes.com

How does ABP work?



2) ABP checks if
<http://adscontent2.indiatimes.com/photo/19031.cms>
matches the list of filters.

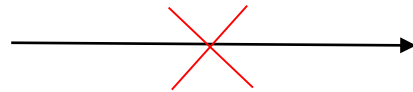


Server- indiatimes.com

How does ABP work?



3) ABP blocks the request if a match occurs



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- Not prepared for female adoration: Arjun Kapoor
- I've always liked very clear characters: Eshaan
- Salman: Sonal take South Indians to task
- Don't see a scene as lowmaking or bad: Shradha
- Never thought about making films: P. Aman Akhtar
- Why singers are left out in film: opening credits
- Masai Diver gets out of Bangladesh
- Chevalier Envy: First Dive

SPORTS

- **Miller, Mandep achieve the impossible**
- IPL: Super Kings face Rajasthan Royals in crucial tie
- How Vinodur 'Sohmay' 'Bluff'ed' his way back into form
- Luis Suarez apologises for biting Brazilian defender

CITY

- **Cop stabs parents to death, held**
- Auto-rider rescues 12 kids in Delhi
- Fined Rs 200, biker attacks traffic cop
- Nagpur: Child rape victim still critical

ENTERTAINMENT

- **Salman's romantic walks with Datsy**
- Saif in political thriller
- Ameesha to play villain
- Sonakshi cares for her staff

Modifications done to ABP code

- For image ads, added a module to fetch the landing (final) page of the ad using XMLHttpRequest API.
- Allowed iframes to load.
- Performed a matching on the landing page of the ad using the filter list created.

Flat Rs 600 Off on Flight

goibibo.com/Cheap-Flight-Tickets -
Use Code-"goret" & Get Rs 600 Off.

Ads by Google

THE TIMES OF INDIA

Mon, Apr 22, 2013 | Updated 11:55AM IST

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2G: DMK ready with dissent note to dra

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'Jobless growth' during UPA-1, admits

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News: All in one-minute @ 10am

Rajesh Kalra's blog: At gunpoint cycle

ET: 'India a market for comp cars? Think again'

```

<iframe allowtransparency="true" title="Advertisement" align="center" scrolling="
"no" frameborder="0" vspace="0" hspace="0" marginheight="0" marginwidth="0"
height="60" width="150" src="http://netspiderads2.indiatimes.com/ads.d11/getad?
slotid=36441" id="fr36441" name="fr36441">
  #document
  <html>
  <head>...</head>
  <body leftmargin="0" topmargin="0" marginwidth="0" marginheight="0"
  bottommargin="0">
  <a href="http://netspiderads2.indiatimes.com/ads.d11/clickthrough?
  msid=19031243&cid=43294&slotid=36441&nsRndNo=1648309066" target="blank">
    
  </a>
  </body>
  </html>
</iframe>

```

- Why singers are left out in films' opening credits
- Mauli Dave opts out of Band Baja Barbaad
- Chevrolet Enjoy: First Drive

All Headlines »

MIDNIGHT SALE
SHOP NOW

832 Get Your **FREE Credit Score Now** **LEARN MORE**
Get **UNLIMITED Access After** TransUnion.

Ads by Google

Bride 18 - 24
Search Now
shaadi.com®

SPORTS

- Miller, Mandeep achieve the impossible**
- IPL: Super Kings face Rajasthan Royals in crucial tie
- How Virender Sehwag 'bluffed' his way back into form
- Luis Suarez apologises for biting Branislav Ivanovic

CITY

Select your city

- Cop stabs parents to death, held**
- Auto driver rescues 12 kids in Delhi
- Fined Rs 200, biker attacks traffic cop
- Nagpur: Child rape victim still critical

More from Cities »

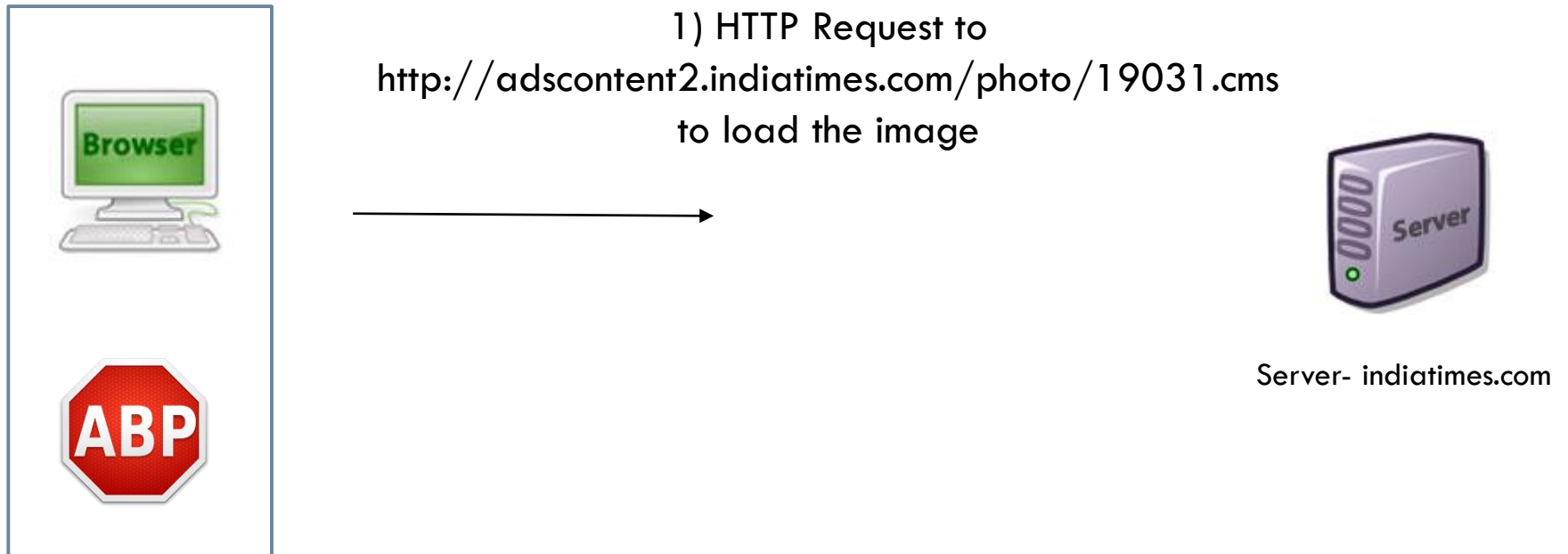
ENTERTAINMENT

Salman's romantic walks with Daisy



- Saif in political thriller
- Ameesha to play villain
- Sonakshi cares for her staff

How does Ad-Filter work?



How does Ad-Filter work?



2) ABP checks if the request is to load an image.
If yes, sends a HTTP Request to
<http://adscontent2.indiatimes.com/photo/19031.cms>
to fetch the landing page of the ad.



Server- indiatimes.com



How does Ad-Filter work?



3) HTTP Response from the server containing the final URL in the response header.

```
HTTP/1.1 302 Moved Temporarily
Date: Wed, 30 May 2012 04:58:22 GMT
Server: Apache-Coyote/1.1
Location: http://192.168.56.102/redirect.php?lang=en
Content-Type: text/html; charset=ISO-8859-1
```



Server- indiatimes.com



How does Ad-Filter work?



4) ABP fetches the final URL from Location field in the response header and matches with the list of filters.



Server- indiatimes.com

How does Ad-Filter work?



5) ABP doesn't block the request if no match occurs



Server- indiatimes.com

How does Ad-Filter work?



6) HTTP Response from the server to load the image.



Server- indiatiimes.com

The screenshot shows the homepage of The Times of India. At the top, there's a navigation bar with categories like Home, City, India, World, Business, Tech, Sports, Entertainment, Life & Style, Women, Health, Spirituality, NR, Real Estate, Photos, Times Now, Video, and LIVE TV. Below the navigation bar, there are several news articles under the heading 'OTHER STORIES'. The articles include: 'is Sonu Goenda single again?', 'Priya Mann's doing only heroine-centric films', 'Ugenda on Karnataka Kalyanpathi', 'Chiru runs for a cause', 'Rakshitha to take on Munirathna', 'Salman Khan's film 'Mental' loses Rs 25 cr', 'Aamir Khan's dinner diplomacy', 'Not prepared for female adulation: Arjun Kapoor', 'I've always liked very clear characters: Enraam', 'Salman-Sohal take South fighters to task', 'Don't take a scene as love-making or bad: Shraddha', 'Never thought about making films: Farhan Akhtar', 'Why singers are left out in films' opening credits', 'Maui Dave opts out of Band Baja Barbaad', and 'Chevrolet Enjoy: First Drive'. At the bottom, there are several advertisements, including one for '832 Get Your FREE Credit Score Now' and another for 'shadi.com'. There are also sections for 'SPORTS', 'CITY', and 'ENTERTAINMENT' with sub-headers like 'Milley: Mandeeep achieve the Impossible', 'Cop stabs parents to death, held', and 'Salman's romantic walks with Daisy'.

Results

www.goibibo.com

Book Now

Get Flat Up to ₹ 800 off on all domestic flights

goibibo.com

*Conditions Apply

LIVE A BETTER LIFE **MENSXP.com**

[IPL Live on YouTube](#)

shaadi.com Let love find you too...
10,000 new members joining everyday! **Join Free**

LIC Life Insurance Plans
Invest Rs.543/Month & Get Rs. 1 Cr. Life Cover+Medical Benefit. Buy Now
LIC.TermInsuranceIndia.co.in

Tata Nano Special Edition
Swipe Your Credit Card this month & Drive Home Nano at 0% Interest.
www.BookaNano.in

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Book Now

Get Flat Up to ₹ 800 off on all domestic flights

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LIC Life Insurance Plans
Invest Rs.543/Month & Get Rs. 1 Cr. Life Cover+Medical Benefit. Buy Now
LIC.TermInsuranceIndia.co.in

Tata Nano Special Edition
Swipe Your Credit Card this month & Drive Home Nano at 0% Interest.
www.BookaNano.in

Ads by Google

Creating the filter list

- Created a filter list consisting of URLs of websites belonging to the following categories- Dating, Matrimony, Nightwear, Adult sites.
- Referred to alexa.com, ranker.com and other websites on the web to create a comprehensive lists of such websites.
- Added following options- “\$image” and “domain” to block only image ads and stop blocking when user visits that domain.
- For example,
shaadi.com[^]\$image, domain=~shaadi.com

Features of the tool

- Allows blocking sensitive image ads.
- Prevents tracking of user's online behavior on sensitive sites by setting a Do-Not-Tracker field in HTTP request header.
- Allows users to disable/enable the tool according to their needs.
- Allows users to block an ad which is not already present in the list.

LIVE A BETTER LIFE

MENSXP.com

Open Link in New Tab
Open Link in New Window
Open Link in New Private Window

Bookmark This Link
Save Link As...
Copy Link Location

View Image
Copy Image
Copy Image Location

Save Image As...
Email Image...
Set As Desktop Background...
View Image Info

Inspect Element (Q)

Inspect Element with Firebug

AdFilter: Block image...

Add AdFilter filter rule

New filter: [Show existing filters...](#)

Blocking filter Exception rule

Look for pattern

The pattern can be any part of the address; asterisks (*) act as wildcards. The filter will only be applied to addresses matching the pattern provided.

The pattern you entered will be used to block ad corresponding to this landing page URL.

netspiderads3.indiatimes.com/ads.dll/clickthrough?*

netspiderads3.indiatimes.com/ads.dll/*

netspiderads3.indiatimes.com^

indiatimes.com^

Custom:

Accept pattern only: at the beginning of the address at the end of the address

Limitations of the tool

- The tool only blocks image ads. It does not work for flash and text ads.
- The tool contains a predefined list of URLs. There still could be some embarrassing ads which may not be included in the list.
 - In such a case, the user will have to manually add that filter to the list using the tool.

Future Work

- Extend the category list to wider range of topics which also include sensitive categories like politics, religion etc.
- Plan to give topical preferences to the users where they can choose the categories from a list for which they want ads to be blocked.
- Allowing third-party tracking to be controlled on selective websites.
- Use clustering algorithm to block ads based on topics instead of a filter list.

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