How to Measure the Engagement of Affiliate Services under Tracking Prevention

Netware Congress 2022

Motoi Iwashita
iwashita.motoi@it-chiba.ac.jp
Chiba Institute of Technology
Prof. Dr. Motoi Iwashita  
- Department of Management Information Science, Chiba Institute of Technology (CIT), Japan  
- B.S. and M.S. in Mathematics and Dr. Eng. degrees in Electrical Engineering  

1985 - 1997, modeling and evaluation of optical access networks at NTT Corporation Electrical Communication Laboratories  
1992 - 1993, Visiting Senior Researcher at British Telecom Research Laboratories  
1997 - 2003, telecom operation support system in NTT East Corporation  
2003 - 2010, multi-service information and communication network design in NTT  
2010 - present, data mining, systems methodology and information systems  

Current research interests  
- Service design and function architecture of information systems  
- Data mining and text mining  
- Management of information reliability and consistency  

Published books, more than 100 journal papers and conference proceedings of IEEE, KES, IARIA, etc. He received ICCGI 2016 best paper awards by IARIA. He is a senior member of IEEE.
Outline

1. Trend of internet advertising
2. Privacy protection issue
3. Intelligent tracking prevention
4. Limitation of engagement
5. Affiliate services
6. Engagement method
7. New problem issue and countermeasure
8. Summary and Future Plan
Advertising cost in Japan

- **Total advertising cost is 6.1 trillion yen in 2020**
- **Decrease of media and promotion media**
- **Increase of internet advertising**

Ref: https://www.dentsu.co.jp/knowledge/ad_cost/2020/
Internet advertising cost

Advertising media cost is dominant

Ref: https://dentsu-ho.com/articles/7694
Advertising media cost

- Search & display advertisings are dominant in 2020
- Video & performance-based advertisings increase

Ref: https://dentsu-ho.com/articles/7694

Total: 1,757 billion yen
Advertisement acceptance

Advertisement acceptance is high

- 77.6% Accept advertisement in any case
- 13.1% Accept advertisement within free service
- 9.4% Accept paid service for preventing advertisement

User impression of tracking

More than 50% feel distrust and discomfort

Tracking = cookie

cookie is a mechanism for temporarily storing information about a user:
- visited website’s homepage
- ID, password
- number of visits etc.

[1st access]

(1) Access to website

(2) Cookie installation

[2nd access]

(3) Stored cookie to server

Client

Server
Tracking mechanism by 3rd party

Functions:
- *advertising targeting and retargeting*
- *access status analysis and user analysis*
- *personalization to improve user experience.***

![Diagram showing the tracking mechanism process](image)
Privacy protection issues

The Personal Information Protection Law requires
- the consent of an individual before their personal information is provided to a third party
- information associated with a browser or terminal identifier, such as a cookie or advertising ID cannot identify an individual

→ it is not regulated as personal information
→ Privacy protection is difficult to proceed, but becomes an important issue
**Trend of intelligent tracking prevention (ITP)**

**disgust and distrust towards the targeting by internet advertisements**

→ **privacy protection awareness increased and constrained**

<table>
<thead>
<tr>
<th>ITP Ver.</th>
<th>Publication date</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITP 1.0</td>
<td>Sep. 2017</td>
<td>Constraint of third-party cookie (Invalid after 24 hours and deletion after 30 days)</td>
</tr>
<tr>
<td>ITP 1.1</td>
<td>Mar. 2018</td>
<td>Strong constraint of third-party cookie (Invalid after 24 hours without session update)</td>
</tr>
<tr>
<td>ITP 2.0</td>
<td>Sep. 2018</td>
<td>Strong constraint of third-party cookie (Prompt deletion without session update) Constraint of first-party cookie (The same constraint as that of the third-party cookie if the website is redirected by more than four domains)</td>
</tr>
<tr>
<td>ITP 2.1</td>
<td>Mar. 2019</td>
<td>Strong constraint of first-party cookie (Expiration date is seven days using JavaScript)</td>
</tr>
<tr>
<td>ITP 2.2</td>
<td>May 2019</td>
<td>Strong constraint of first-party cookie (Expiration date is one day using JavaScript)</td>
</tr>
<tr>
<td>ITP 2.3</td>
<td>Sep. 2019</td>
<td>Strong constraint of first-party cookie (The same constraint with JavaScript for local storage)</td>
</tr>
</tbody>
</table>
Market share of browsers in Japan

- *Chrome and Safari are dominant*
- *iPhone users are dominant*

Ref: https://gs.statcounter.com/browser-market-share/all/japan
Big effect for affiliate service

**Affiliate service is performance-based advertising**

Cannot calculate engagement of affiliate

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**Diagram:**
- **Advertiser**
  - Register for advertising fee
  - Product delivery
  - Purchase products
- **User**
  - Visit affiliate site
- **ASP**
  - Reward
- **Affiliate**
  - Register & get rights to introduce a product
Market size of affiliate service

Affiliate market is growing to more than 500 billion yen in 2025

Population of affiliates is 3.87 and 4.35 million in 2011 and 2013, respectively
3rd party cookie doesn’t work ...

Using CNAME as issuing 1st party cookie

(1) Access to website

(2) Tag forward

(3) Address resolution

DNS server
A.co.jp → CNAME: B.co.jp

(4) Cookie assignment

Server B
(B.co.jp)
Proposal of Federate Learning of Cohorts (FLoC)

“FLoC” is one of the idea, but it has some problems

➔ Google shifts to develop “Topics”

(1) Calculate hash value based on browsing history of websites

(2) Send only hash value to Google

(3) ID production and assignment for groups (with similar characteristics)

(4) Cohort information sent to all Chrome users

(5) Cohort ID sent to website

(6) Announcement of ad. based on cohort ID
Necessary of improved scheme

Cookie restrictions such as ITP tend to get tightened
→ necessary to consider tracking without using cookies
→ enough to know the number of accesses, purchases, etc.

The information from the server-side access log

1. request source IP address
2. identity of the client
3. user ID of the person requesting the resource
4. accessed time
5. request type and resource being requested
6. HTTP response status code
7. amount of data sent from the server to the client
8. referral information (URL accessed most recent)
9. user agent (OS and browser of the access terminal)
# Server property (case1)

## Access log

<table>
<thead>
<tr>
<th>Server property</th>
<th>Affiliate/provider</th>
<th>ASP</th>
<th>Advertiser</th>
<th>Original</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Player</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliates</td>
<td>Measurable</td>
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<td>-</td>
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<tr>
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<td>Difficult to measure</td>
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Server structure of ASP (1)

Access log

User

Website of an affiliate
Banner

Processing unit
Redirect function

Engagement measuring function
Request source IP address
User agent
Accessed time
Request type & resource requested
Referrer information
Affiliate ID
Product site URL
Purchase site URL

ASP server

Database
Log DB
Affiliate DB
Advertisement DB

Website of an advertiser (yy.xx.co.jp)
Product site URL
Purchase site URL

Website of an advertiser (xx.co.jp)
Product site URL
Purchase site URL
Server property (case 2)

Access log

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</table>
Server structure of ASP (2)

Access log

1. User → Website of an affiliate
   - Banner
   - Redirect function
   - Engagement measuring function
     - Request source IP address
     - User agent
     - Accessed time
     - Request type & resource requested
     - Referrer information
     - Affiliate ID
     - Product site URL
     - Purchase site URL

2. Website of an affiliate → ASP server
   - Database
     - Log DB
     - Affiliate DB
     - Advertisement DB

3. Website of an advertiser (yy.xx.co.jp)
   - Product site URL
   - Purchase site URL

4. Website of an advertiser (xx.co.jp)
   - Product site URL
   - Purchase site URL
## Server property (case 3)

### Access log

<table>
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<th>Affiliate/ provider</th>
<th>ASP</th>
<th>Advertiser</th>
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</thead>
<tbody>
<tr>
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<td>Advertiser</td>
<td></td>
<td>-</td>
<td>Measurable</td>
<td></td>
</tr>
</tbody>
</table>
Server structure of ASP (3)

Access log

1. User → Website of an affiliate (Banner)
2. Banner → Processing unit
   - Redirect function
   - Engagement measuring function
     - Request source IP address
     - User agent
     - Accessed time
     - Request type & resource requested
     - Referrer information
     - Affiliate ID
     - Product site URL
3. Processing unit → Website of an advertiser (yy.xx.co.jp)
   - Product site URL
   - Purchase site URL
4. Website of an advertiser (yy.xx.co.jp) → ASP server
   - Database
     - Log DB
     - Affiliate DB
     - Advertisement DB
5. ASP server → Website of an advertiser (xx.co.jp)
   - Product site URL
   - Purchase site URL
Flow of measuring engagement

Start

Input X and Y

Log DB

Get log(i) (i = 1, 2, …n)

Accessed through affiliate (yy.xx.co.jp)?

i < n

i ← i + 1

Delete log(i)

Affiliate DB

Refferer information = affiliate URL?

j < n

j ← j + 1

Link log(i) with affiliate ID

Classify log (i) if set of request source IP address + user agent = user ID linked with affiliate ID?

Advertisement DB

Product site URL and accessed time

Product purchased

Product purchased and its number

Measure engagement of affiliate

Stop

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6
## Merit and limitations

### Privacy protection and calculation limitation

**Announcement beforehand for collecting logs**

<table>
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<tr>
<th>Tracking method</th>
<th>Required information</th>
<th>Precision of tracking</th>
</tr>
</thead>
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<tr>
<td>Cookie</td>
<td>ID and password, Visited websites, Accessed time</td>
<td>Precise tracking per user until cookie deletion time. Tracking fails when cookies are blocked by users.</td>
</tr>
<tr>
<td>Access log</td>
<td>Request IP address, User agent, Accessed time, Request content by user, Affiliate ID, Purchased product</td>
<td>Tracking per user fails if the logs have the same user information (accessed time, request IP address, user agent). Tracking per group with the same user information.</td>
</tr>
</tbody>
</table>
Newly concern for tampering

- the information based on the rewritten information will be transmitted
- Difficult to detect who cheated while transmitting information
Summary and future scope

- Method for measuring affiliate contribution in affiliate services without using cookies

- First issue: viewpoint of personal information protection
  - Some countermeasures are necessary

- Second issue: quantitative evaluation of log analysis methods
  - Accuracy of the log analysis method with respect to the method of using cookies.

- Third issue: mechanism of reliability of information content and transmission that occurs between players.
Thank you for your attention