Ad Tech vs. Ad-blockers
Challenges and Opportunities

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Online Advertising

• Intrusive
  – Stuff as much as possible
  – Tricks: hidden overlays
Online Advertising

- Creepy
  - Targeted advertising incentivizes tracking
  - Ecosystem of data brokers
Online Advertising

- Malware
  - Malvertising

Some NYTimes.com readers have seen a pop-up box warning them about a virus and directing them to a site that claims to offer antivirus software. We believe this was generated by an unauthorized advertisement and are working to prevent the problem from recurring. If you see such a warning, we suggest that you not click on it. Instead, quit and restart your Web browser. Questions and comments can be sent to webeditor@nytimes.com.
Online Advertising

- Overheads
  - Slower page loads
  - Data
THIS LOOKS LIKE A JOB FOR AD-BLOCKERS
Ad-blockers to the rescue!

- Increasingly popular
Popular ad-blockers

- Desktop
  - Browser extensions
  - Browsers

- Mobile
  - Ad-blocking browser apps
  - Cross-app ad-blockers

- Network
How do ad-blockers work?

• Normal ad load
How do ad-blockers work?

HTTP GET ad

Filter list of regular expressions

Verbatim text
This text must be present in the address to be blocked.

Wildcard character
This stands for any number of characters.

Separator
The address must either end here or a separator character like ? or / has to follow.

/banner/*/*
Filter lists

• Filter lists
  – Ads (EasyList)
  – Trackers (EasyPrivacy)
  – Malware (Malvertising list by Disconnect)
  – Anti-adblockers (Adblock Warning Removal)

• Shared by most ad-blockers
  – Some use customized lists
Filter lists

- Crowdsourced feedback
  - EasyList authors (fanboy, MonztA, Famlam, Khrin)
Ad-blocking Challenges (Opportunities)

- Automation
- Circumvention
- Monetization
Automation
Issues with filter lists

- **Slow**
  - 20% rules are late by as much as 3 months [Iqbal et al. IMC’17]

- **Error prone**
  - False positives cause breakage

- **Redundant**
  - 201 rules account for 90% ad-blocking [Vastel et al. @Brave’18]
Filter list automation

• Idea: Supervised learning of filter list rules

• Static [Iqbal et al. IMC’17]
  – JavaScript (AST features)

• Dynamic [Shubha et al. PETS’18]
  – HTTP (request URL, header fields)

• Challenges: ground truth
Circumvention
Anti-adblocking

• Detect ad-blockers and ask users to disable them
  – third-party vs. first-party anti-adblockers

• Static [Iqbal et al. IMC’17]
  – Detect/block anti-adblocking JS using supervised ML

• Dynamic [Zhu et al. NDSS’18]
  – Detect anti-adblocking condition using differential
    JavaScript execution analysis
  – Forced false execution
Evasion

• Adversarial advertisers can manipulate ad delivery to bypass filter lists
  – Facebook: obfuscated signatures of ad elements
  – Instart Logic: pool of domains

• Solution [Iqbal et al. arxiv’18]
  – AdGraph: Graph representation that combines information across the different layers of the web stack (HTTP, HTML, and JavaScript)
Monetization
Keep (and improve) existing ad ecosystem

• Keep ads but improve them
  – User studies of different ad formats and block the most intrusive ones

• Better Ads Standard
  – Coalition for Better Ads (Google et al.)
  – Google Chrome ad filter
  – Blocks 9/55 ad formats

• Acceptable Ads
  – Acceptable Ads Committee (Eyeo GmbH)
  – Adblock Plus, Adblock, Adguard
  – Blocks 51/55 ad formats
(Micro) payments

• Several initiatives
  – Tiptheweb.org [2010]
  – Flattr (Eyeo) [2010]
  – Contributor (Google) [2014]
  – Basic Attention Token (Brave) [2017]

• Unlikely that (micro) payments will get large-scale traction
New ads

• Both Better Ads and Acceptable Ads work with the existing online advertising ecosystem

• BAT ads [details forthcoming]
  – Basically browser acts as the ad exchange
  – Simplifies the online advertising ecosystem
  – Client-side ML (sounds similar to Adnostic)
  – Interesting: Users choosing to view ads will be rewarded with BAT tokens
    • 1 BAT token ≈ $0.25
Ad-blocking deployment

• Vision
  – Most people use ad-blocking extensions
  – Most browsers natively support ad-blockers

• Browsers compete based on ad-blocking features

• Need continued collaboration to keep up in the arms race
  – Most ad-blockers currently share public filter lists
  – Hopefully ML-based ad-blocking won’t become “secret sauce”
Nice Collateral Damage

• Tracking
  – Ad-blockers can already block trackers (e.g., EasyPrivacy)

• No/less targeted advertising means no/little incentive for tracking

• Ad-blockers are potentially the most impactful privacy-enhancing technology
Ad blocking is like garlic.

You hang it on your door to keep Dracula away from sucking your blood.

Ad blocking is not the enemy.

Just stop being Dracula.

- Doc Searls