



"Is Our Children's Apps Learning?" Automatically Detecting COPPA Violations

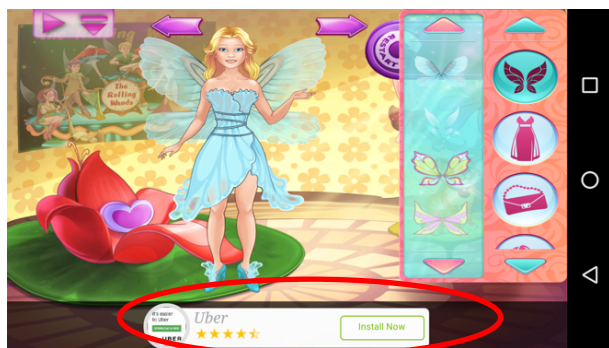
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Introduction

COPPA limits online data collection from children. [2] Enforcement is a largely manual process. [3,4]



Many apps are free of cost. Developers can generate revenue by displaying ads.

Ad networks offer "plug and play" libraries to display ads and build user profiles for improved targeting. [1]

Objectives

Research Question: What restricted information do children's apps share with third parties? Are there trends?

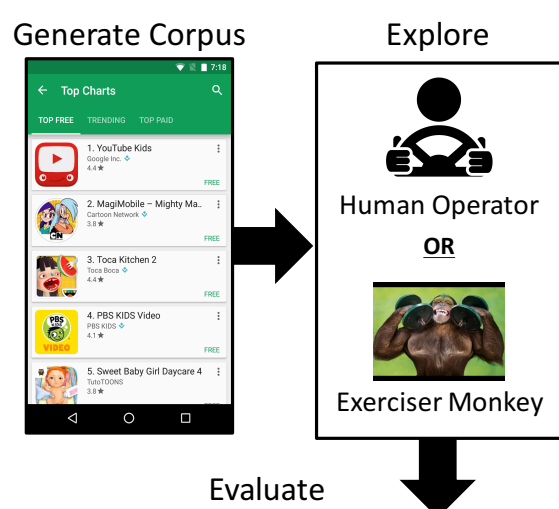


Engineering Objective: Develop an automated pipeline to detect COPPA-restricted data collection. Evaluate the thoroughness of automated testing vs. deliberate human exploration.

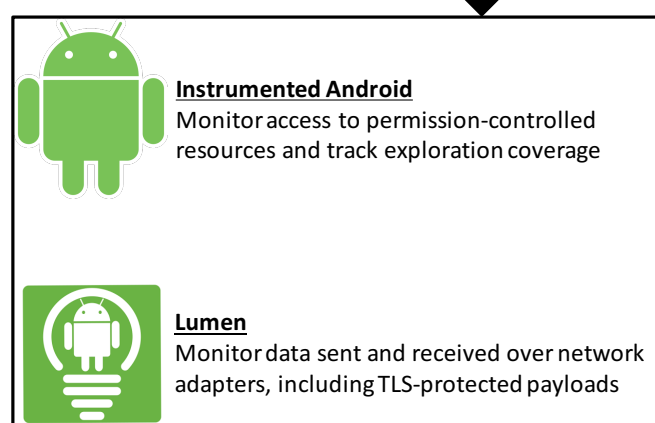
Methodology

Test Progress

- $N_{\text{auto}} = 111$
- $N_{\text{manual}} = 61$
- Corpus size $N = 446$

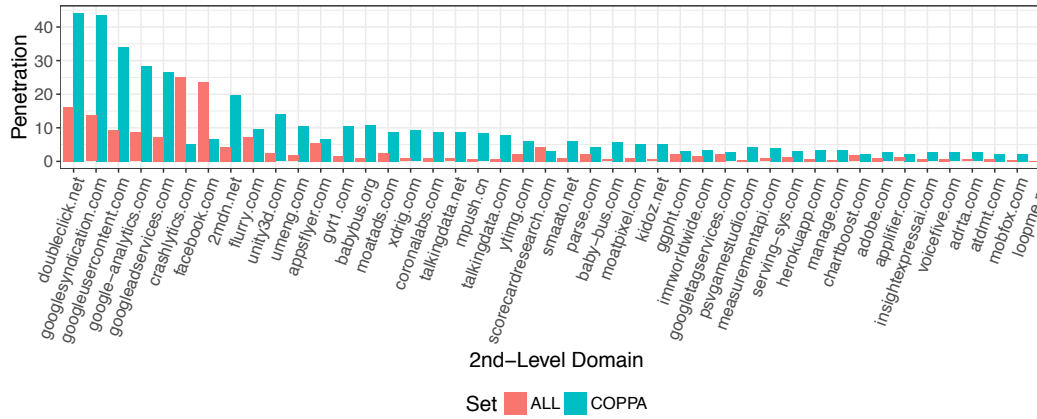


Note: All apps manually explored have also been automatically run for comparison



Preliminary Results

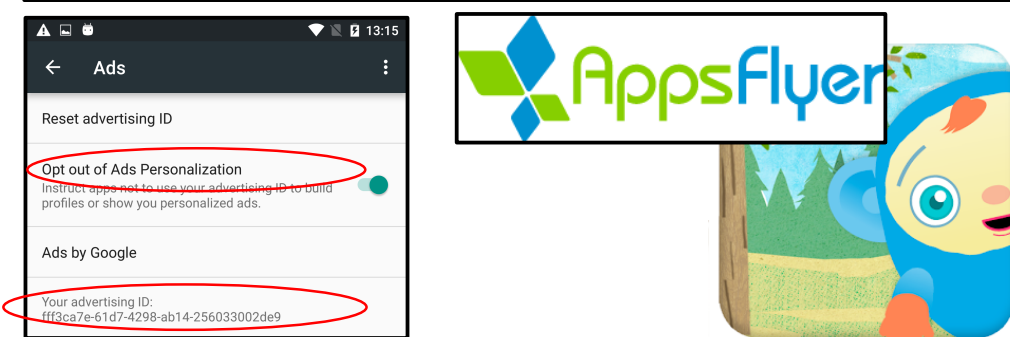
Third-Party Domain Distribution



- As a whole, communication with third-party ad networks and analytics is more common in children's apps than all apps in general

Persistent Identifier (Non-)Opt-Out

```
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Outbound connection contents for 38559-
>54.77.172.114-443(dns:track.appsflyer.com) (app.com.babyfirsttv.peekabooescampin
(sni:track.appsflyer.com):TLS(proxyed) with 5 packets (1451 bytes raw, 940 processed)
11-02 13:26:14.077 9756 10171 I Haystack.Flow: POST /api/v2.3/androidvent?
buildnumber=1.9&app_id=com.babyfirsttv.peekabooescampin HTTP/1.1
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Content-Length: 620
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Connection: close
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Content-Type: application/x-www-form-urlencoded
11-02 13:26:14.077 9756 10171 I Haystack.Flow: User-Agent: Dalvik/2.1.0 (Linux; U; Android 6.0.1; AOSP on angler Build/
MASTER)
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Host: track.appsflyer.com
11-02 13:26:14.077 9756 10171 I Haystack.Flow: Accept-Encoding: gzip
11-02 13:26:14.077 9756 10171 I Haystack.Flow:
11-02 13:26:14.077 9756 10171 I Haystack.Flow:
device=angler&installDate=2016-11-02_0126-0700&firstLaunchDate=2016-11-02_0126-0700&sdk=23&carrier=&date1=2016-11-
02_0126-0700&at_preinstalled=false&advertiserIdEnabled=false&appsflyerKey=yZnL9BNtUzZvLavevLpUg5kIang=English&ap
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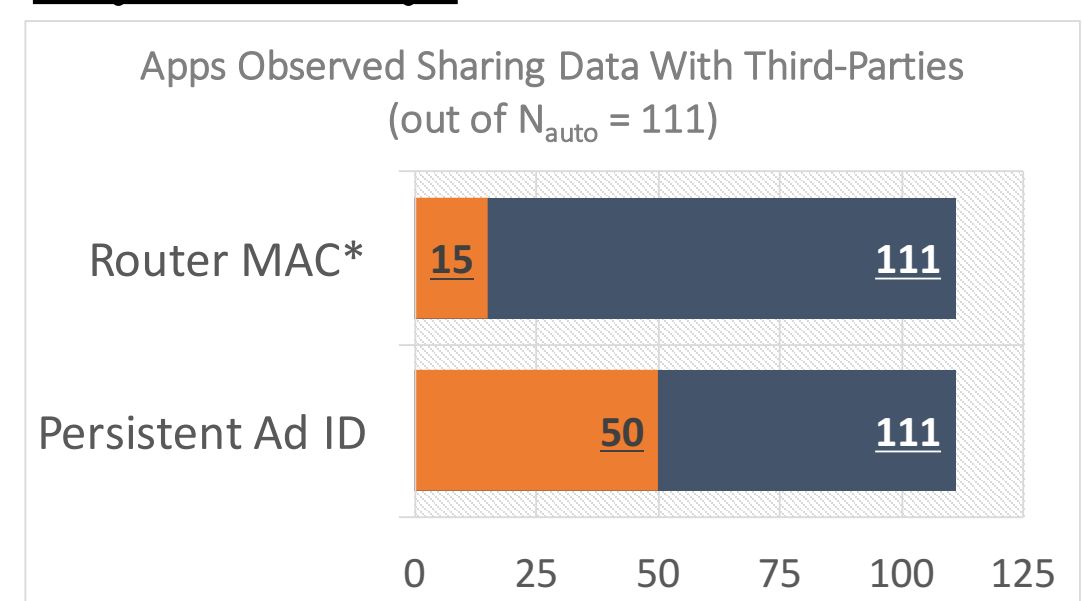
- Third parties collect persistent identifiers even after users opt out
- Developer BabyFirst notified of finding, no response yet

Router MAC Address Geolocation

- Third parties get Wi-Fi router MAC addresses; these are street-resolvable
- Developer BabyBus notified of finding, now working to resolve this

Conclusion

Key Takeaways



* All from the same developer

- Not all apps and third party libraries respect user preferences opting out of persistent identification and tracking
- Third-party services may be using workarounds to collect otherwise unsanctioned geolocation data
- Data collection methods present in one app could be predictive of similar behaviors in other products from the same developer

Research Questions for Future Work

- How can we make a "smarter monkey" for auto testing?
- Do free apps collect data differently than paid apps?
- How accurately do privacy policies describe actual app data collection behavior?
- Do children's games collect and transmit data when not in use?

References

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- Federal Trade Commission. Children's Online Privacy Protection Rule ("COPPA"), 1998. <https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/childrens-online-privacy-protection-rule>
- U.S. Federal Trade Commission. Mobile Apps for Kids: Current Privacy Disclosures are Disappointing. <http://www.ftc.gov/os/2012/02/120216mobileappskids.pdf>, February 2012.
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