**Problem Statement**

- Major browsers have already blocked or are in the process of blocking third-party cookies
  - Safari, Firefox, and Brave have already blocked third-party cookies
  - Google Chrome aims to block third-party cookies by 2024
- Advertisers and Trackers are looking for new ways to identify and track users
- We hypothesize that first-party cookies are being used in lieu of third-party cookies by trackers and advertisers
- If first-party cookies are being used for tracking, following questions arise:
  - What is the extent of use of first-party cookies by trackers and advertisers?
  - Is it possible to isolate and block first-party tracking cookies without causing significant website breakage?

**Methodology**

- We crawl 10,000 websites twice – once with third-party cookies enabled, and once with third-party cookies blocked.
- This helped us measure difference between the two crawls and identify the trackers switching to first-party cookies when third-party cookies are blocked.
- By studying behavior of these cookies, we identify key features and properties of first-party tracking cookies.
- We identified presence of first-party tracking cookies on a majority of sites and discovered sharing of these cookies to other tracking domains.

**Countermeasure**

- We train a machine learning algorithm on features computed by modeling interactions between different elements of a webpage.
- CookieGraph relies on key features related to first-party tracking cookies, including exfiltration to different domains, infiltration of identifier values from trackers, use of other types of storage by setting script, etc.
- CookieGraph outperforms other methods of restricting cookies by at least 13 percent in accuracy and more than 20 percent in precision.

**Breakage Analysis**

- Breakage analysis shows it is possible to isolate and block first-party tracking cookies.
- CookieGraph outperforms existing countermeasures by only causing minor breakage on 2 percent of sites.
- Other countermeasures result in major breakage on at least 10 percent of the sites.