

Advertising systems in social media

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Who am I?



- **Mainack Mondal:** Social Systems, Web and network security, usable security and privacy, system security and privacy
 - Office: CSE 316
 - Also teaches crypto

What are we going to learn

- Social advertising systems
 - Why bother about them?
 - The curious case of Facebook ads
 - How can we leverage these systems for doing good
- Abuse of the advertising systems
 - Why is targeted advertising bad?
 - Privacy risks with PII based targeting

Why bother about social advertising?

Advertising systems

- These systems fuel your favorite websites and services
 - Facebook, Twitter, Google, YouTube ...
- But what is digital advertising?
 - “digital advertising is any form of advertisement that appears online, whether on your web browser, your social media apps, or other destinations and properties across the internet.”

<https://www.swishvideoapp.com/what-is-digital-advertising-a-comprehensive-guide/#>

Advertising systems: Example

twitter ads

All Images News Videos Maps More Settings Tools

About 2,920,000,000 results (0.65 seconds)

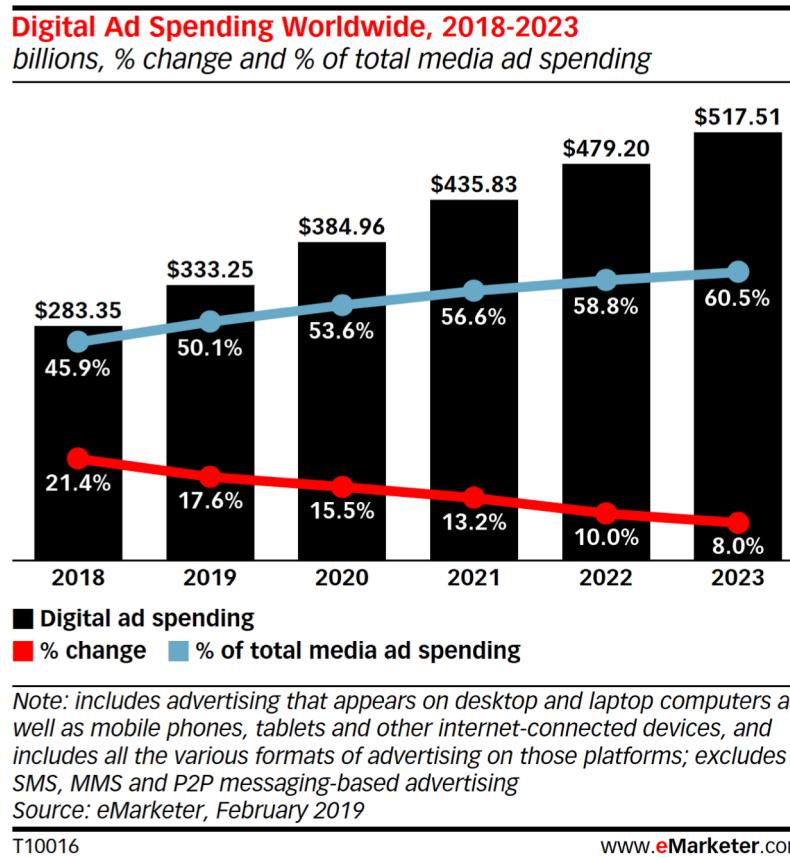
Snapchat Ads | Reach your Audience | Drive Results
Ad forbusiness.snapchat.com/business ▾
Achieve your business goals with ads that lead to action on Snapchat. Drive results with fullscreen ads tailored to the mobile-first generation. Measure & Optimize.

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Ad business.linkedin.com/sponsored-ads ▾
Build Your Brand and Raise Awareness With Targeted Ads on LinkedIn. Promote Content. Types: Website Conversions, Lead Generation, Brand Awareness, Website Visits, Video Views, Engagement, Job Applicants.
[LinkedIn Ad Pricing](#) · [Case Studies](#) · [Conversion Tracking](#) · [Brand Awareness](#) · [Video Views](#)

Twitter Ads
<https://ads.twitter.com> ▾
Advertise on Twitter. Solutions to ... Don't have a Twitter account? Sign up ... Learn more about Twitter Ads and our advertising policies on our help center →.

How important are advertising systems?

- Very!



What is social advertising?

- Advertising on social platforms
 - Shown during your browsing social platforms
 - Leverage socially shared data to target ads (you shared with your friend that you really like to sing)
 - Shows social interactions to influence you

Social advertising: Example

Shown in social platform: Facebook

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Create Ad

and cable needs!

- ✓ Type-C to Type-A, Lightning, Micro Adaptor
- ✓ Nano Sim Storage & Pin
- ✓ Sim Pin
- ✓ LED Light... [See More](#)

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UrbzSurvival Multi-function Universal Smart Adaptor Card

2.4K

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You can't miss the scar on 12-year-old Janvi's shaven head. It's a constant reminder to he...

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Social advertising: Example

Social data: I like gadgets

The image shows a Facebook news feed with several posts and ads. A red box highlights the first post, which features a product image of a multi-functional USB adapter (labeled 'budí') and includes the text: "Social data: I like gadgets". Another red box highlights a sponsored ad for "Travel planning made easy" with the text: "Social data: I like to ask friends where to travel". A third red box highlights a post from a friend with the text: "Social data: My friends donated here". At the bottom, a red box highlights the social interactions section with the text: "Social interactions: Likes, comments, shares".

Sponsored

Travel planning made easy

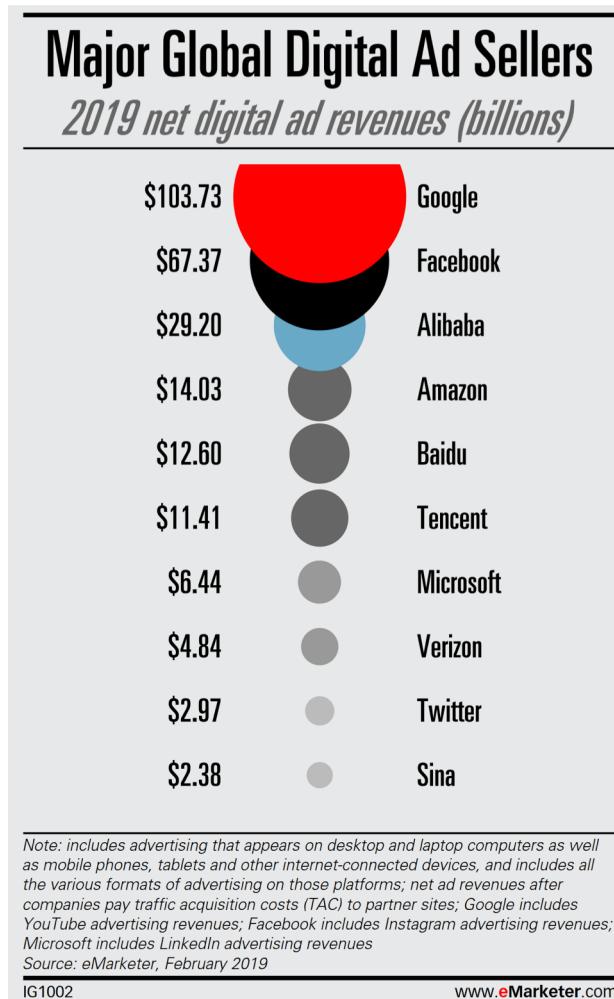
Social data: I like to ask friends where to travel

Social data: My friends donated here

Social interactions: Likes, comments, shares

Is social advertising a big business?

- Yes!



How Facebook ads work?

From a system's point of view how does advertising work?

- An advertiser goes to Facebook.com ad interface
 - <https://www.facebook.com/advertising>
 - Different from your run-of-the-mill Facebook.com
- She uploads the ad material
 - Picture, video, title, headlines, embedded link etc.
- She targets the audience
 - Only IIT Kharagpur students, who are male, 18-24 yrs. old
- Finally Facebook shows the ad and bill her
 - Facebook also gives her stats on who has seen the ad
 - She pays Facebook

Let's look under the hood

- Let's try to float an ad
 - <https://www.facebook.com/advertising>
- Check out the super detailed targeting parameters
 - Also Facebook just binned the normal users in quite detailed way and shows ads to interested users
 - How?
 - Principles of inferring interest and recommender systems

Leveraging social advertising platform data

What data can you get from advertising platforms?

- You can divide the population by
 - Location
 - Age
 - Gender
 - Interests ...
- You will get the population count for each of the divisions
- Question: How can you leverage the data?

You can use this data to understand demographics of any sub-population

- Check out:
 - <https://fb-doha.qcri.org/>
- Let's look into how you can compute "cultural assimilation" of a population
 - Paper: Rock, Rap, or Reggaeton?: Assessing Mexican Immigrants' Cultural Assimilation Using Facebook Data, WWW'19
 - <https://ingmarweber.de/wp-content/uploads/2019/05/Rock-Rap-or-Reggaeton-Assessing-Mexican-Immigrants-Cultural-Assimilation-Using-Facebook-Data.pdf>

Finding Cultural assimilation

- Key Question:
 - To what degree Mexican immigrants in the U.S. are assimilating culturally?
- Proxy of cultural assimilation: Musical taste of second generation Mexicans
 - Used musical interest categories of population
 - Challenge: How to know they are second generation?

Data collection

- Collected Facebook data across the following demographics
 - gender, age, home location, ethnic affinity, and interests.
- How to detect second generation?
 - Find Hispanic American non-expats with interest in Mexico -
 - “Mexican Americans (Mexico)”
 - Find Hispanic Spanish-speaking American non-expats --
 - “Mexican Americans (Spanish)”
 - Find Hispanic Americans non-expat located in cities with a high concentration of Mexican-Americans -- Mexican Americans (communities)

Is this data representative?

- Yes!

Population name	Facebook estimate	Population estimate
Anglos	112,000,000 (59%)	189,591,066
African Americans	29,000,000 (78%)	37,014,326
U.S. Hispanics	14,000,000 (57%)	24,695,129
Mexican-Americans (communities)	4,100,000 (18%)	23,407,709
Mexican-Americans (Spanish)	1,700,000 (9%)	19,380,816
Mexican-Americans (Mexico)	2,900,000	n/a
Mexican immigrants	9,400,000 (82%)	11,508,371
Mexicans in Mexico	62,000,000 (56%)	111,375,417

What are the key populations for this study?

- Non-Hispanic white Americans (“Anglos”)
- African Americans
- Mexican immigrants to the United States
- Mexican-Americans
- Mexican people living in Mexico

How to compute musical interests of a population?

- They also divided each population with music genres
 - Total 741 music genre
 - Rock, pop, jazz, hip-hop etc.
 - Compute interest ratio: fraction of a population p interested in music genre I

$$I_{p,i} = \frac{\text{count}(p, i)}{\sum_{i' \in I} \text{count}(p, i')}$$

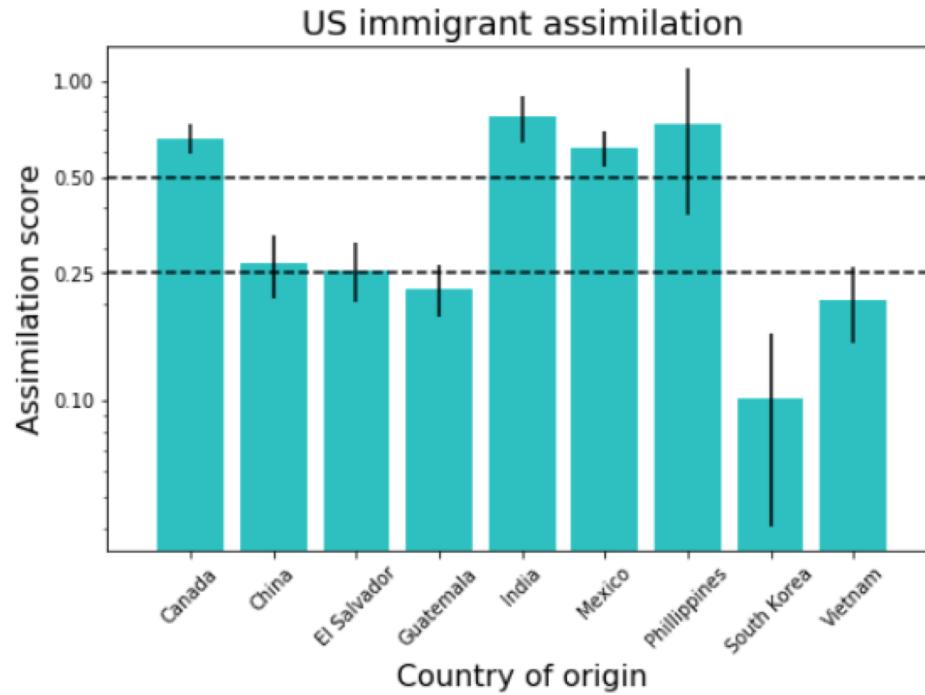
- Question: if 10 users from population p show interest in hip-hop music, 60 in rock music and 30 in rap music, what is the interest ratio for rap?

Finally: How to quantify assimilation?

- For each genre the compute the assimilation ratio (AR)
 - Ratio of ex-pat interest proportion and destination interest proportion
 - Higher AR, the expats looks similar to the destination population

$$AR_i = \frac{I_{expat,i}}{I_{dest,i}}$$

Which community in US are most assimilated?



- India and Philippines are most assimilated!

There are more applications

- Check
<https://www.slideshare.net/IngmarWeber/presentations>
 - Using advertising data to model migration, poverty and digital gender gaps
 - Correlated Impulses: Using Facebook Interests to Improve Predictions of Crime Rates in Urban Areas
 - Digital advertising data for migration research

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