Investigating ad transparency mechanisms in social media

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Work done with Athanasios Andreou, Giridhari Venkatadri, Krishna P. Gummadi, Patrick Loiseau, Alan Mislove
But explanations are not trivial

- The **systems** they have to explain are **complex**
- Many design choices
  - Format, length, amount of details …
- What is a **good explanation**?
  - Improve **control**
  - Satisfies **curiosity**
  - Detect **malicious or deceiving advertising**
  - Verify **compliance**
In this talk

Explanations for social media targeted advertising

Ad explanations

Why am I being shown this ad?

Data explanations

What data the ad platform knows about me?

[NDSS’18]
How does targeted advertising on Facebook works?
Ads on Facebook
Anyone can be an advertiser in just a few clicks!
How can advertisers target users?

**Traditional targeted advertising:** boolean formula

\[
\text{Audience} = \text{married} + \text{new mover} + \text{lives in Grenoble}
\]
How advertisers target users

### Audience
Define who you want to see your ads. [Learn more.](#)

<table>
<thead>
<tr>
<th>Create New</th>
<th>Use a Saved Audience</th>
</tr>
</thead>
</table>

#### Custom Audiences
- Add Custom Audiences or Lookalike Audiences
- Exclude
- Create New

#### Locations
- Everyone in this location
- United States
  - United States
  - Include
- Add locations
- Add Bulk Locations...

#### Age
- 18 - 85+

#### Gender
- All
- Men
- Women

#### Languages
- Enter a language...

#### Detailed Targeting
INCLUDE people who match at least ONE of the following:

<table>
<thead>
<tr>
<th>Add demographics, interests or behaviors</th>
<th>Suggestions</th>
<th>Browse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td>Interests</td>
<td>#</td>
<td></td>
</tr>
</tbody>
</table>

#### Connections
- Behaviors
- More Categories
Many attributes available for targeting
Many attributes available for targeting

<table>
<thead>
<tr>
<th>Country</th>
<th>Facebook</th>
<th>Acxiom</th>
<th>Epsilon</th>
<th>Experian</th>
<th>DLX</th>
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<td>US</td>
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<td>14</td>
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<td>10</td>
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<td>France</td>
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<td>Brazil</td>
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<tr>
<td>India</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>614</td>
</tr>
</tbody>
</table>

+ Free (hundreds of thousands) formatted attributes!
Attributes can be invasive
## Data on everyone

<table>
<thead>
<tr>
<th>Category</th>
<th>Fb</th>
<th>Acxiom</th>
<th>Experian</th>
<th>DLX</th>
<th>Epsilon</th>
<th>Data broker (unspecified)</th>
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<tr>
<td>(B) Anniversary</td>
<td>1</td>
<td>-</td>
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<td>(B) Consumer Classif.</td>
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<td>(B) Digital activities</td>
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<td>(B) Expats</td>
<td>74</td>
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<td>(B) Charitable donations</td>
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<td>(B) Financial</td>
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<td>(B) Job role</td>
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<td>(B) Media</td>
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<td>(B) Purchase behavior</td>
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<td>(B) Residential profiles</td>
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<td>(I) Family and relationships</td>
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<td>(I) Fitness and wellness</td>
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<tr>
<td>Total nb. of attributes</td>
<td>614</td>
<td>128</td>
<td>5</td>
<td>350</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Audience reach</td>
<td>196M</td>
<td>152M²</td>
<td>131M</td>
<td>147M</td>
<td>71M</td>
<td>145M</td>
</tr>
</tbody>
</table>
Data on everyone

- Out of 230M users (US):
  - Politics (US): 179M
  - Financial/Net worth/Liquid Assets: 74M
  - Family & Relationships: 138M
How can advertisers target users?

PII-based targeted advertising ("custom list")
Why did I received this ad?

Ad explanations
… it’s complicated

Targeted advertising is a complex system

- Facebook inferred some attributes
- Advertiser used attributes to select audience
- Facebook matched the ad to me through auctions
Facebook provides explanations

Why Am I Seeing This Ad?

One reason you’re seeing this ad is that Leibniz wants to reach people interested in Ferrero SpA, based on activity such as liking Pages or clicking on ads.

There may be other reasons you’re seeing this ad, including that Leibniz wants to reach people ages 25 and older who live or were recently in Germany. This is information based on your Facebook profile and where you’ve connected to the internet.

Explications are voluntary or to satisfy law
Desired properties of explanations

• Do explanations show all the attributes? (completeness)
• Were the attributes showed actually used by the advertisers? (correctness)
• Are explanations specific to each user? (personalization)
• Are explanations consistent across time? (consistency)
We need standards for explanations

To protect against adversarial explanations:

- Insufficient / unsatisfactory
  - That offer no insightful/actionable information to consumers

- Misleading / fake
  - Designed to gain consumer acceptance for a service
  - Misled consumers about the process
Measurement methodology

- Chrome extension to collect ads from Facebook timeline
  - 35 users for 5 months
  - 26K unique ads and explanations

- Controlled experiments targeting users with ads:
  - We targeted users
  - We collected explanations
  - 96 successful campaigns

\[
\text{Ground truth}
\]
Are Facebook explanations complete?

- For ads targeting customer PII:
  - “One reason you're seeing this ad is that Booking.com added you to a list of people they want to reach on Facebook. They were able to reach you because you’re on their customer list or you’ve provided them with your contact information off of Facebook. This is based on customer information provided by Booking.com.”

- Does not saw what PII booking.com used!
  - Email ? Telephone ? Name+address? etc.
Are Facebook explanations complete?

- For ads targeting **data broker attributes**
  - “One reason you're seeing this ad is that Peugeot wants to reach people who are part of an audience created based on **data provided by Acxiom**. Facebook works with data providers to help businesses find the right audiences for their ads. Learn more about data providers.”

- Does not say **what Acxiom provided attributes** were used!
  - Financial data? Purchasing habits? etc.
Are Facebook explanations complete?

• For ads targeting Facebook attributes:
  • “One reason you're seeing this ad is that Peek & Cloppenburg wants to reach people interested in Shopping and fashion, based on activity such as liking Pages or clicking on ads.”
  • “There may be other reasons why you're seeing this advert, including that Acer wants to reach people aged 18 to 45 who live or have recently been in Germany. This is information based on your Facebook profile and where you've connected to the Internet.”

• Picks exactly one attribute (besides gender, location, age)
Validation of incompleteness

• Ran several controlled ads targeting ourselves using a custom list and selecting millennial & expats
  
  • “One of the reasons why you're seeing this advert is because we think that you may be in the Millennials audience. This is based on what you do on Facebook.…”
  
  • Only one features, millennial (not expats), shown!
Do explanations need to be complete?

- Should they specify all attributes in ad targeting?

Arguments for:
- Avoid misleading and insufficient explanations:
  - Designed to gain consumer acceptance for a service
  - Builds trust and incentivizes cooperation

Arguments against:
- Targeting formula may be a business secret
- Overloads users with information (need succinct explanations)
Selecting attributes for explanations

“One reason you're seeing this ad is that Peek & Cloppenburg wants to reach people interested in Shopping and fashion, based on activity such as liking Pages or clicking on ads.”

- Are the explained attributes the most important?
  - Is Shopping and fashion the most important of all the user’s attributes that Facebook and the advertised used to target the user?
How Facebook selects attributes

- Ran controlled ads to reverse-engineer Facebook’s feature selection strategy
- Facebook appears to prioritize attributes based on
  - Their *type*: Demographic > Interest > PII > Behavioral
  - Their *prevalence*: Most prevalent first
- Unclear, if this is the right prioritization for users
Are Facebook explanations (at least) correct?

- Experiment: Ran a **controlled ad** targeting ourselves using a **custom list** and selecting **millennials & expats**
  - “There may be other reasons why you're seeing this advert, including that Vacations in Saarbüchen wants to reach **people aged 18 and above who live or have recently been in Germany**. This is information based on your Facebook profile and where you've connected to the Internet.”

- **Never used attributes shown in explanations!**
Need for rigorous explanations

**Incomplete** explanations:

- Malicious advertiser can conceal sensitive/discriminatory attributes by adding a common popular attribute to the targeting audience

**Misleading** explanations:

- Fail to capture accurately the reasons why a user is targeted —> induce false sense of trust
What data the ad platform knows about me?

Data explanations
How is the data inferred?

- Facebook actions (e.g., likes, clicks, posts)
- Web browsing (online but outside Facebook)
- Offline data
- Ad platform
- Motherhood
- New mover
- Likely to engage in Politics (Liberal)
Explanations of the data inference process

Ad Preferences Page
Desired properties of a data explanation

• Specificity
• Completeness
• Correctness
Measurement methodology

• Build tool that collects the Ad Preference Page daily
  ▶ Collection of real-world data
  ▶ Controlled ad campaigns
Evaluation of properties

• Most explanations are vague

<table>
<thead>
<tr>
<th>Pattern</th>
<th>No explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have this preference because you liked a Page related to interest</td>
<td>2,866</td>
</tr>
<tr>
<td>You have this preference because you clicked on an ad related to</td>
<td>2,095</td>
</tr>
<tr>
<td>interest</td>
<td></td>
</tr>
<tr>
<td>You have this preference because we think it may be relevant to you</td>
<td>785</td>
</tr>
<tr>
<td>based on what you do on Facebook, such as pages you’ve liked or ads</td>
<td></td>
</tr>
<tr>
<td>you’ve clicked</td>
<td></td>
</tr>
<tr>
<td>You have this preference because you installed the app app – name</td>
<td>107</td>
</tr>
<tr>
<td>This is a preference you added.</td>
<td>2</td>
</tr>
</tbody>
</table>

• Explanations are incomplete
  • No data broker attributes appear
Need for rigorous explanations

Incomplete explanations:
  • Does not show the full picture to the user
  • Provides a false sense of trust

Vague explanations:
  • Does not allow users to control the outputs in the future
Takeaways

• Just mandating explanations is not enough!
• Badly designed explanations can be dangerous
  • Easily exploitable by malicious advertisers
• Designing good explanations is complicated
  • Different purposes ask for different properties
Open challenges

• How to pick a few (K) features for explanations?

• How to determine the importance of a user attribute?
  • Does it reveal privacy sensitive information?
  • Is it a rare (or low prevalence) attribute in population?
  • Does it exert the most influence?

• What properties explanations need to protect against malicious advertisers?
A step towards more transparency
AdAnalyst

Make sense of the ads you receive on Facebook
- Enhance transparency by aggregated statistics
- Enhance transparency in a collaborative way

http://adanalyist.mpi-sws.org/

Disable/pause AdBlockPlus on Facebook!
Ads view
Ads

Check your daily unique ad consumption, by clicking on any date in the calendar!

<table>
<thead>
<tr>
<th>Time: 11/12/2017 00:11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertiser: MATLAB</td>
</tr>
<tr>
<td>Advertiser category: Software</td>
</tr>
<tr>
<td>Explanation: One reason you're seeing this ad is that MATLAB wants to reach people who may be similar to their customers. Learn more. There may be other reasons you're seeing this ad, including that MATLAB wants to reach people ages 25 to 65 who live in France. This is information based on your Facebook profile and where you've connected to the internet.</td>
</tr>
<tr>
<td>Compact explanation: Lookalike Audience</td>
</tr>
<tr>
<td>Users also received this ad for: Lookalike Audience</td>
</tr>
<tr>
<td>The advertiser targeted other users with: Lookalike Audience, Computer vision (Interests), Data science (Interests), Machine learning (Interests)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time: 11/12/2017 00:09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertiser: Wish</td>
</tr>
<tr>
<td>Advertiser category: App Page</td>
</tr>
<tr>
<td>Explanation: You're seeing this ad because Wish wants to reach women ages 16 to 60 who live in Germany. This is information based on your Facebook profile and where you've connected to the internet.</td>
</tr>
<tr>
<td>Compact explanation: 16-60 (Age/Gender/Location)</td>
</tr>
<tr>
<td>The advertiser targeted other users with: English (US) (Biographical Data)</td>
</tr>
</tbody>
</table>

Download this machine learning eBook to learn basic concepts and explore advanced algorithms.

Wish www.wish.com What other products are on sale under 5€ today?
Data view
Latest data Facebook has inferred about you

Latest interests:

Diane Kruger
People
You have this preference because you clicked on an ad related to Diane Kruger.
Added on: 08/12/2017

Term of endearment
Business and industry
You have this preference because you clicked on an ad related to Term of endearment.
Added on: 04/12/2017

Photograph
Hobbies and activities
You have this preference because you clicked on an ad related to Photograph.
Added on: 04/12/2017

Telephone
Business and industry
You have this preference because you clicked on an ad related to Telephone.
Added on: 04/12/2017

Short Message Service
Technology
You have this preference because you clicked on an ad related to Short Message Service.
Added on: 03/12/2017

Latest demographics:

Anniversary within 31-60 Days
People with a relationship anniversary (marriage, domestic partnership, etc.) occurring wi...
Added on: 08/12/2017

Life, Physical and Social Sciences
People with roles in life, physical and social sciences. Examples include: professor, chem...
Added on: 04/12/2017

Close Friends of Women with a Birthday in 0-7 days
Close Friends of Women with a Birthday in 0-7 days
Added on: 04/12/2017

Close friends of people with a birthday in 0-7 days
Close friends of people with a birthday in 0-7 days
Added on: 04/12/2017

Architecture and Engineering
Includes Software Engineer, Technician, Electrician, Technical Engineer, Machinist, Archit...
Added on: 03/12/2017
Infrequent attributes Facebook has inferred about you

Attributes that are shared by the smallest number of users on Facebook

Infrequent Interests:

- **The Interview (2014 film)**
  - News and entertainment
  - You have this preference because you clicked on an ad related to The Interview (2014 film).
  - Nb of Facebook users sharing this attribute: 23.79k
  - Added on: 29/08/2017

- **Riverbed Technology**
  - Technology
  - You have this preference because you clicked on an ad related to Riverbed Technology.
  - Nb of Facebook users sharing this attribute: 27.71k
  - Added on: 03/11/2017

- **Nicușor Dan**
  - People
  - You have this preference because you liked a Page related to Nicușor Dan.
  - Nb of Facebook users sharing this attribute: 152.56k
  - Added on: 24/04/2017

- **Cloud computing security**
  - Business and industry
  - You have this preference because you clicked on an ad related to Cloud computing security.
  - Nb of Facebook users sharing this attribute: 188.89k
  - Added on: 03/11/2017

- **Troll Tennis**
  - News and entertainment
  - You have this preference because you liked a Page related to Troll Tennis.
  - Nb of Facebook users sharing this attribute: 176.17k
  - Added on: 24/04/2017
Timeline of when Facebook inferred each attribute:

- Behaviors
- Demographics
- Interests

**Interests for 01/12/2017**

- Gigi (band)
- Florence
- Sack
- M.I.A. (rapper)
- Nylon
- Rib
Top attributes used by advertisers to target you:

**Interests:**
- Online shopping
- Travel
- Shopping
- Sports
- Technology
- Food and drink
- Entertainment
- Higher education
- Home decor
- Pets
- Beauty
- Online advertising

**Demographics:**
- Family-based Households
- Healthcare and Medical
- Millennials
- Birthday in February
- Anniversary within 31-60 Days
- Life, Physical, and Social Science

**Behaviours:**
- Facebook Page Admins
- Technology early adopters
- Facebook access
- (OS): Mac OS X
- All frequent travelers
- Primary browser: Chrome
- Android devices

**Biographical details:**
- English (US)
- Master’s degree
- French (France)
Advertisers view
Latest advertisers targeting you

New advertisers that are targeting you:

- Walk Off The Earth
  01/12/2017
- LE BHV MARAIS
  10/12/2017
- RED by SFR
  09/12/2017
- adidas Originals
  09/12/2017
- Gustave Roussey
  07/12/2017

New advertisers that have Personally Identifiable Information about you (advertisers who have your name, phone number, email, address, or whose website or app you have used) that can directly target you:

- CircoViral
  05/09/2017
- PLus.de
  05/09/2017
- RunFire zsch
  05/09/2017
- Vogue
  03/09/2017
- scatedela
  03/09/2017

Contact us if you didn’t give your information to these advertisers.
Unpopular advertisers targeting you

Malicious advertisers are rarely popular, here is a list of the advertisers with the lowest number of likes that targeted you:

- Vacation in Nce
  - Nb likes: 0
- Voyages-Test
  - Nb likes: 0
- Vacation in Saarbrucken
  - Nb likes: 3
- Wordiness
  - Nb likes: 3
- Ginsana Deutschland
  - Nb likes: 7

Advertisers that use the most unique targeting

Advertisers can target people using infrequent attributes in order to reach a very specific audience (such microtargeting has been used in political ads to influence voters). These are the advertisers that have targeted you, using the most infrequent attributes:

- UNTOLD
  - Nb of users that have the targeting attributes: 342.63k
  - Targeting attributes: Dub FX
- nature research
- Chloé
  - Nb of users that have the targeting attributes: 384.08k
  - Targeting attributes: Max Planck Society
  - Targeting attributes: Hôtel Meurice
- Insight Health Apps
  - Nb of users that have the targeting attributes: 487.67k
  - Targeting attributes: Biofeedback
- Paradisia
  - Nb of users that have the targeting attributes: 613.16k
  - Targeting attributes: Beirut (band)
How are advertisers targeting you overall

Advertisers use different types of info to target users (see more...). Here is a summary of how you have been targeted:
The type of advertisers that are targeting you

Company, Organization or Institution

- Retail Company
  - Media/News Company
  - Internet Company
- Travel Company
- Education
- Nonprofit
- Computer...
- Consulting...
- Insurance...
- Energy Company
- Biotechnology...
- Communication...
- Government...
- Politically...
- School...
- Cause...

Left click to zoom-in/ Right click to zoom-out (two finger click in Mac)
Examples
Website:
https://www.facebook.com/218961468129322

Advertiser category: Other/ Medical & Health

Nb of likes: 253,701k

Nb of ads you received: 5

You received the first ad on: 30/04/2017

You received the last ad on: 05/10/2017

The advertiser targeted you with: Master's degree (Biographical Data),

The advertiser targeted other users with:
Bachelor's degree (Biographical Data), Fitness and wellness (Interests), Food and drink (Interests), Management (Interests), Master's degree (Biographical Data), Politics and social issues (Interests),
BÜNDNIS 90/DIE GRÜNEN

Website: https://www.facebook.com/47217143218
Advertiser category: Company, Organization or Institution/ Political Party
Nb of likes: 179.59k
Nb of ads you received: 4
You received the first ad on: 07/09/2017
You received the last ad on: 18/09/2017
The advertiser targeted you with: Anti-fascism (Interests), Greenpeace (Interests), Politics (Interests),
The advertiser targeted other users with: Anti-fascism (Interests), Family (Interests), Greenpeace (Interests), Homosexuality (Interests), Organic food (Interests), Politics (Interests), Veganism (Interests),
Soyez au top de la tendance minimaliste avec les nouveaux modèles SKIN.
Russia is once again under the rule of a tsar. Read stories like this and more when you subscribe to The Economist for €20 and get a free notebook.
Subscribe to The New Yorker and get 12 weeks for as little as $6. Plus a free tote bag.
"I wanted to tell him I had loved him but hadn’t known how to have platonic love with a man. I wanted to apologize for coming into his life with my mixed signals so soon before he died."

**Time:** 22/11/2017 20:52

**Advertiser:** The New York Times

**Advertiser category:** Newspaper

**Explanation:** One reason you’re seeing this ad is that The New York Times wants to reach people who have visited their website or used one of their apps. This is based on customer information provided by The New York Times. There may be other reasons you’re seeing this ad, including that The New York Times wants to reach people ages 18 and older who live in France. This is information based on your Facebook profile and where you’ve connected to the internet.

**Compact explanation:** PII-based targeting

**Users also received this ad for:** PII-based targeting

**The advertiser targeted other users with:** Lookalike Audience, PII-based targeting, Social Neighborhood, English (UK) (Biographical Data), English (US) (Biographical Data), US Politics (Very Liberal) (Demographics)
Time: 12/10/2017 12:57
Advertiser: Western Union

Advertiser Category: Product/Service

Explanation: One reason you're seeing this ad is that Western Union wants to reach people who speak "Romanian". This is based on information from sources such as your Facebook profile. There may be other reasons you're seeing this ad, including that Western Union wants to reach people ages 18 and older who live or were recently in Germany. This is information based on your Facebook profile and where you've connected to the internet.

Compact explanation: Romanian (Biographical Data)

Users also received this ad for: Romanian (Biographical Data)

The advertiser targeted other users for: Bollywood movies (Interests), Romanian (Biographical Data)
Backup slides
Examples of attributes

<table>
<thead>
<tr>
<th>Parent</th>
<th>Reach</th>
<th>Sibling leaf categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/Politics (US)</td>
<td>179M</td>
<td>Likely To Engage in Politics (Conservative), Likely To Engage in Politics (Liberal), Likely To Engage in Politics (Moderate), US Politics (Conservative), US Politics (Liberal), US Politics (Moderate), US Politics (Very Conservative), US Politics (Very Liberal)</td>
</tr>
<tr>
<td>I/Family and relationships</td>
<td>138M</td>
<td>Dating, Family, Fatherhood, Friendship, Marriage, Motherhood, Parenting, Weddings</td>
</tr>
<tr>
<td>B/Consumer Classification/India</td>
<td>3100</td>
<td>(A) Affinity for High Value Goods/India, (A+B) Affinity for Mid-High Value Goods/India</td>
</tr>
<tr>
<td>D/Parents/All Parents</td>
<td>59M</td>
<td>(0-12 months) New Parents, (01-02 Years) Parents with Toddlers, (03-05 Years) Parents with Preschoolers, (06-08 Years) Parents with Early School Age Children, (08-12 Years) Parents with Preteens, (13-18 Years) Parents with Teenagers, (18-26 Years) Parents with Adult Children, Expectant parents, Parents (All)</td>
</tr>
<tr>
<td>B/Charitable donations</td>
<td>75M</td>
<td>Animal welfare, Arts and cultural, Environmental and wildlife, Health, Political</td>
</tr>
<tr>
<td>B/Financial/Spending methods</td>
<td>140M</td>
<td>Line of Credit, 2 Lines of Credit, 3, Active credit card user, Any card type, Bank cards, Gas, department and retail store cards, High-end department store cards, Premium credit cards, Primarily cash, Primarily credit cards, Travel and entertainment cards</td>
</tr>
<tr>
<td>B/Purchase behavior/Store types</td>
<td>34M</td>
<td>High-end retail, Low-end department store</td>
</tr>
<tr>
<td>B/Residential profiles</td>
<td>5.5M</td>
<td>Recent homebuyer, Recent mortgage borrower</td>
</tr>
<tr>
<td>B/Automotive/New vehicle buyers (Near market)/Style</td>
<td>102M</td>
<td>Crossover, Economy/compact, Full-size SUV, Full-size sedan, Hybrid/alternative fuel, Luxury SUV, Luxury sedan, Midsize car, Minivan, Pickup truck, Small/midsized SUV, Sports car/convertible</td>
</tr>
<tr>
<td>B/Purchase behavior/Health and beauty</td>
<td>90M</td>
<td>Allergy relief, Antiperspirants and deodorants, Cosmetics, Cough and cold relief, Fragrance, Hair care, Health and wellness buyers, Men’s grooming, Oral care, Over-the-counter medication, Pain relief, Skin care, Sun care, Vitamins</td>
</tr>
<tr>
<td>B/Automotive/Owners/Vehicle age</td>
<td>95M</td>
<td>01 year old, 01/15 years old, 16/20 years old, 2 years old, 3 years old, 3/5 years old, 6/10 years old, Over 20 years old</td>
</tr>
<tr>
<td>D/Home/Home Ownership</td>
<td>26M</td>
<td>First time homebuyer</td>
</tr>
<tr>
<td>B/Residential profiles</td>
<td>5.1M</td>
<td>New mover</td>
</tr>
<tr>
<td>B/Residential profiles</td>
<td>3M</td>
<td>Likely to move</td>
</tr>
<tr>
<td>B/Charitable donations</td>
<td>34M</td>
<td>All charitable donations, Cancer Causes, Children’s Causes, Veterans</td>
</tr>
<tr>
<td>B/Purchase behavior/Home and garden (DLX)</td>
<td>25M</td>
<td>Entertaining, Home renovation, Organization, Tools</td>
</tr>
<tr>
<td>B/Purchase behavior/Buyer profiles (Experian)</td>
<td>86M</td>
<td>Coupon users</td>
</tr>
<tr>
<td>B/Financial/Banking (Epsilon)</td>
<td>2.1M</td>
<td>Credit union member</td>
</tr>
</tbody>
</table>