Beyond CPM and CPC:
Determining the Value of Users on OSNs

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1.Introduction

- CPM and CPC

- Advertising on Web and OSNs
  - ▶ Google vs. Facebook

1.Introduction

- **User Value**

  - **Direct impressions**
    - advertising opportunities that a user provides by browsing OSN site pages

  - **Indirect impressions**
    - advertising opportunities that a user provides by enticing others to browse OSN site pages
    - Cascading effect

1.1 Data

- Detailed data from Facebook[1]
  - Year : 2009
  - 90,269 users
  - New Orleans metropolitan area

1: B. Viswanath, A. Mislove, M. Cha and K. P. Gummadi. On the Evolution of User Interaction in Facebook. In WOSN, 2009.

2.Background

- Facebook's Advertising Model
    - Targeting parameters (location, gender, interests)
    - CPM and CPC
    - Auction based selection of bids
- Problem?
    - Targeting users who are influential

3.USER VALUE FRAMEWORK

- First,
  - different actions produce different numbers of indirect impressions
  - How to measure that

- Next,
  - how users' characteristics affect their value

- Finally,
  - Proposing a comprehensive methodology for computing users' values that can be applied to many OSNs.

3.1 The Value of Actions

- measuring the value of actions

  - Estimating invisible actions
    by considering visible actions as a proxy for invisible actions

  - Using previous studies
    that have access to private invisible actions

    - *How?*

      - clickstream data (e.g., records of requests to the OSN)

Facebook		Orkut		Hi5	
Category	Share	Category	Share	Category	Share
Home	35 %	Profile,Friends	41%	Photos	45%
Profile	16 %	Photos	31%	Profile	20%
Photos	16 %	Scrapbook	20%	Home	13%
Friends	4.7 %	Other	3%	Friends	13%
Groups	3 %	Communities	1%	Groups	1%

Table 1: Comparison of popular user activities across three OSN sites [8, 28].

3.2 Users Characteristics and Interactions

- Users Characteristics
  - (gender, age, location, interests) public by default
  - direct impressions

- Users Interactions
  - generally possible to obtain some information about the social graph, such as the number of friends and their identities.
  - indirect impressions

3.3 Measuring User Value

- User characteristics (u_c)

$$u_c \propto t \cdot d \propto t \cdot \log\left(\#friends + 1\right)$$

- User activity in her own profile ($u_{a\,self}$)

$$u_{a_{self}} \propto \sum_i w_i \ \#action_i$$

- Friends activity in a user's profile($u_{a\,friends}$)

$$u_{a_{friends}} \propto \sum_{v \in |u|} v_c \sum_i w_i \ \#action_i$$

3.3 Measuring User Value

$$u_{value} \propto \left(u_{a_{self}} + u_{a_{friends}} + u_{a_{visitor}}\right) u_c$$

3.3 Measuring User Value

- Using different weights to:
  - privacy settings,
  - Circles
  - Groups or community activity

4. APPLYING USER VALUE

- Dataset
  - considering the 50,564 out of the 90,269 users.
    - users with public profile

  - Users who share:
    - their age and gender,
    - have at least one interest
    - have at least one post on their wall

  - 23,950 users have at least one interest
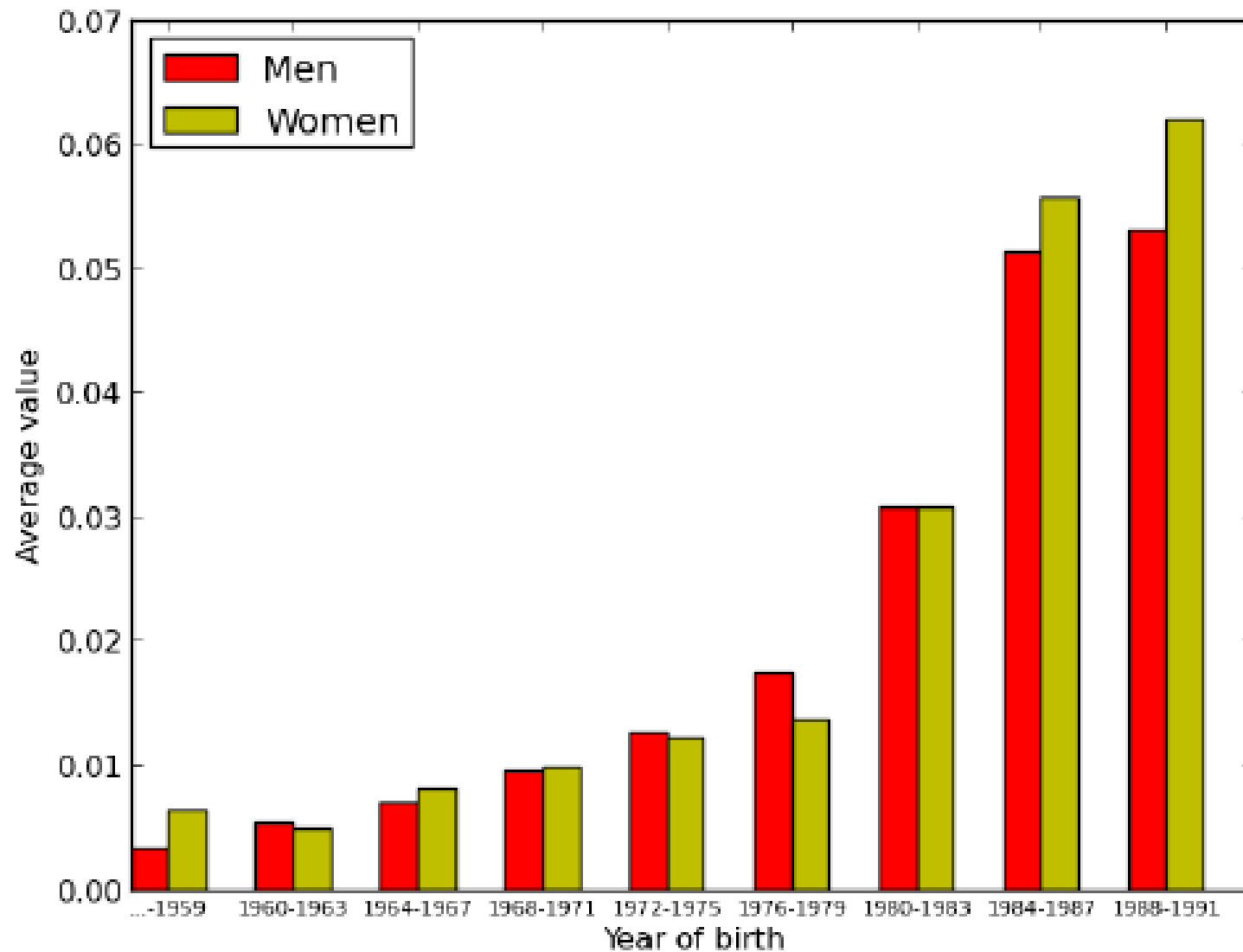 - 7,054 users have any posts

4. APPLYING USER VALUE

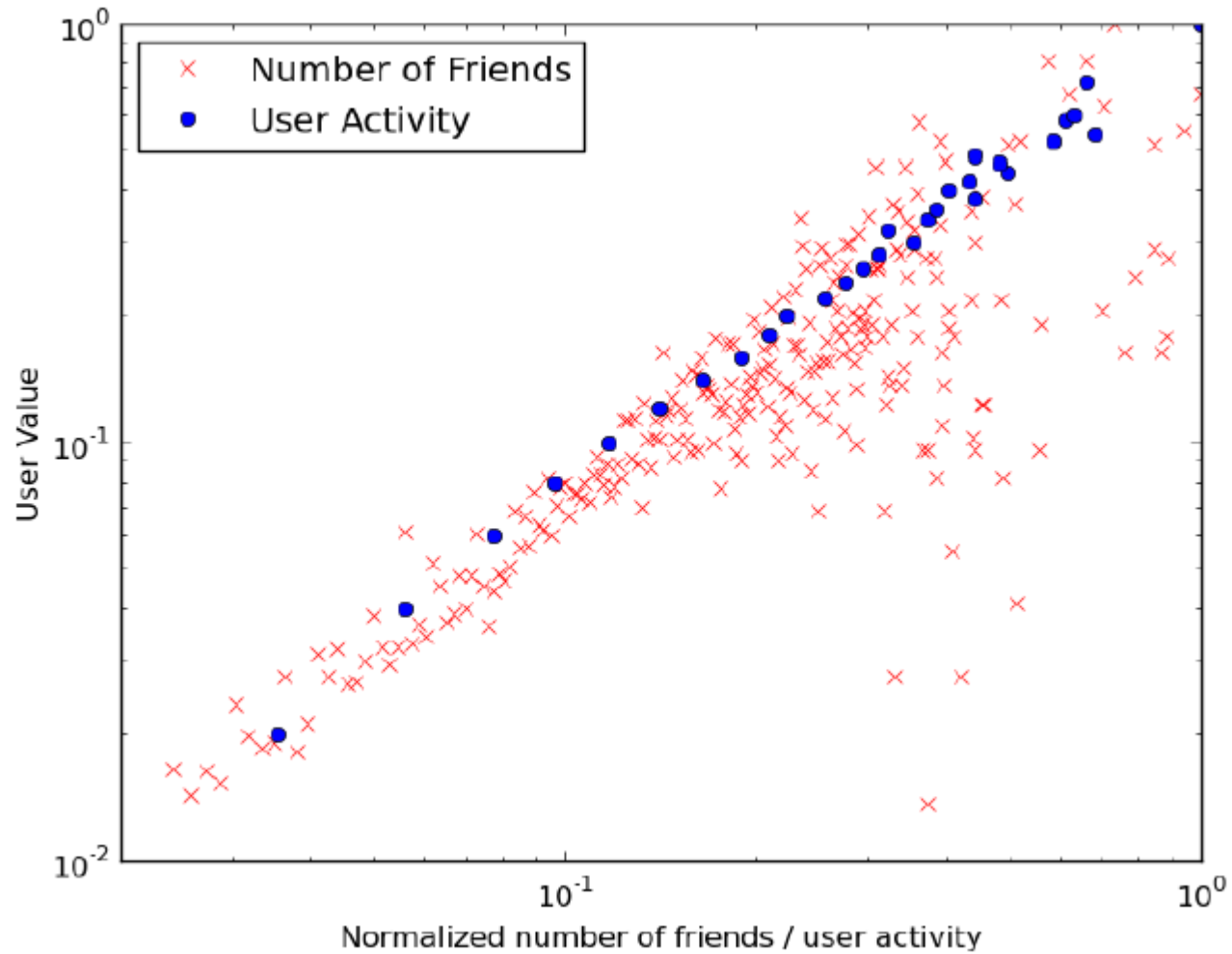- Choosing Weights
  - Categories:
    - posts, **0.75**
    - multimedia, **0.21**
    - and communities. **0.04**

4.3 Value Distributions

4.3 Value Distributions

5.2 Collecting Data

- query Facebook's Ads platform for the suggested bid
- of each of the 4,265 users

- First,
  - distribution is remarkably even,
  - CPC of 99% of users' interests ranging between $0.62 and $1.53 CPM for 99% of users' interests ranging between $0.07 and $0.31.
- No specific interests are significantly more highly valued by advertisers than others.

5.2 Collecting Data

- Second,
  - Prices are quite stable over time

  - Indicating that our methodology is likely to hold over at least short periods of time.
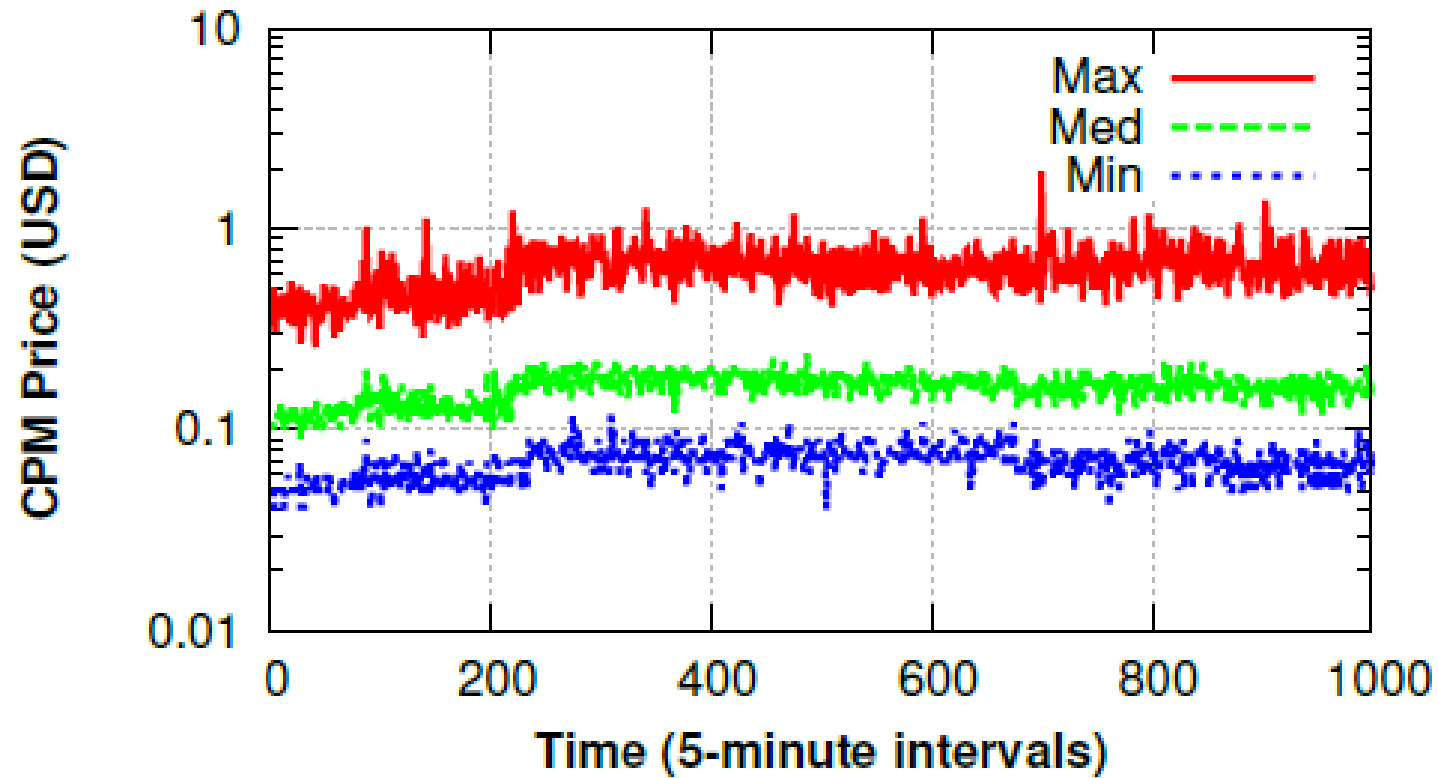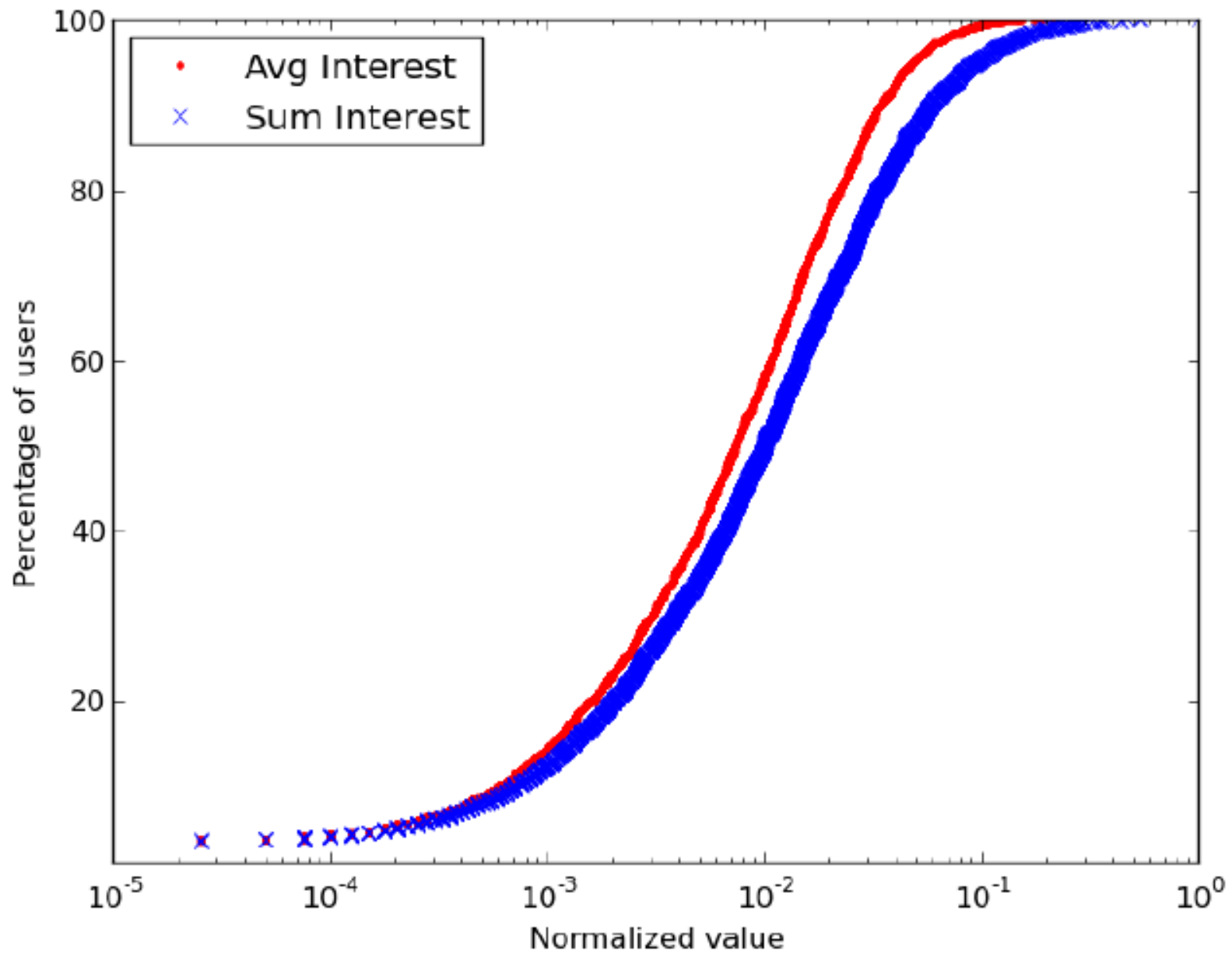
Figure 3: Facebook's suggested CPM bids from one particular set of parameters over three days, showing price stability over time (note y-axis in log-scale).

Leveraging user value

- the OSN provider is able to:

    - make accurate estimates of user value

    - encourage \high value" behavior by its users by directly rewarding them

    - charge higher prices for advertising to such users,