

Characterizing User Behavior in Online Social Networks

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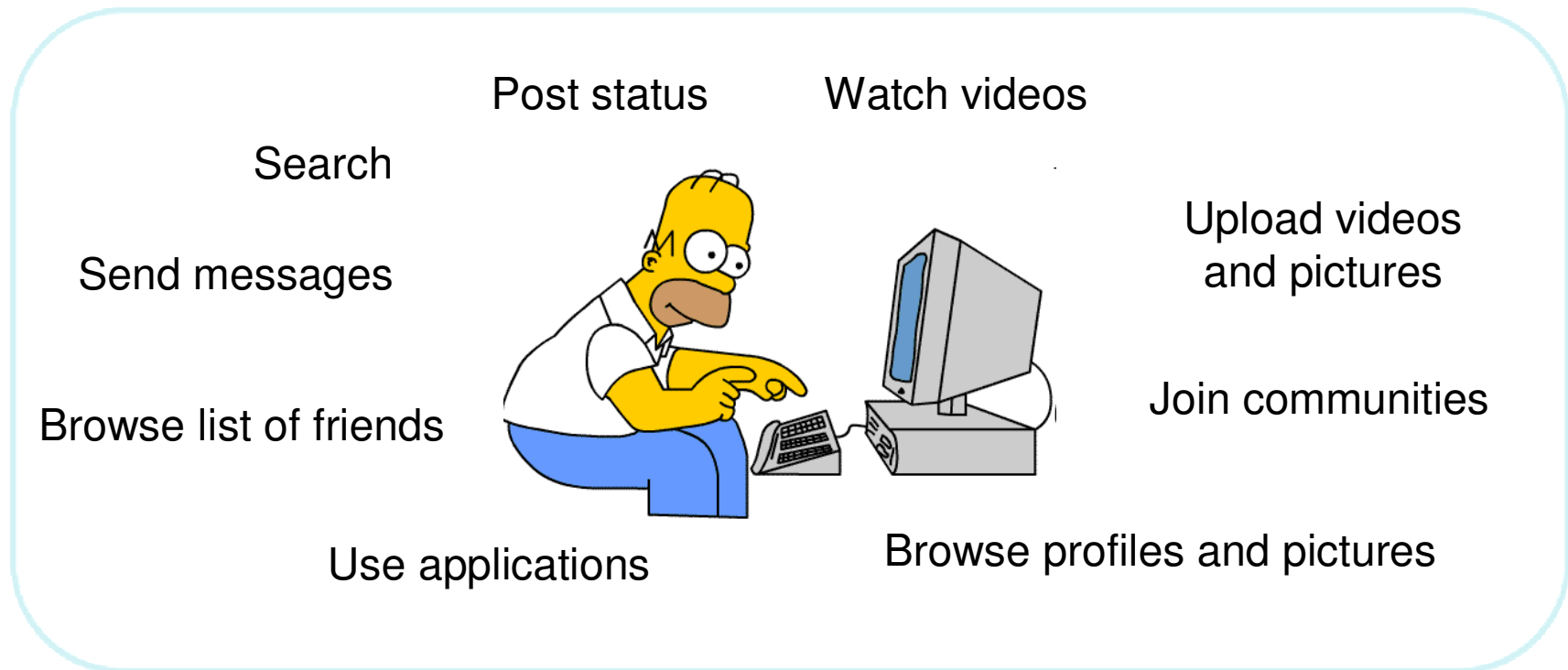
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What do users do in OSNs?



Understanding user behaviors in OSNs is useful for better design of interface and content distribution

Goals

- 1) Characterize user navigation patterns in OSN
 - ✓ Frequency, time spent, and sequence of activities

- 2) Understand social interaction patterns in OSN
 - ✓ Study patterns based on not one, but all activities



Part1.
Data and statistics



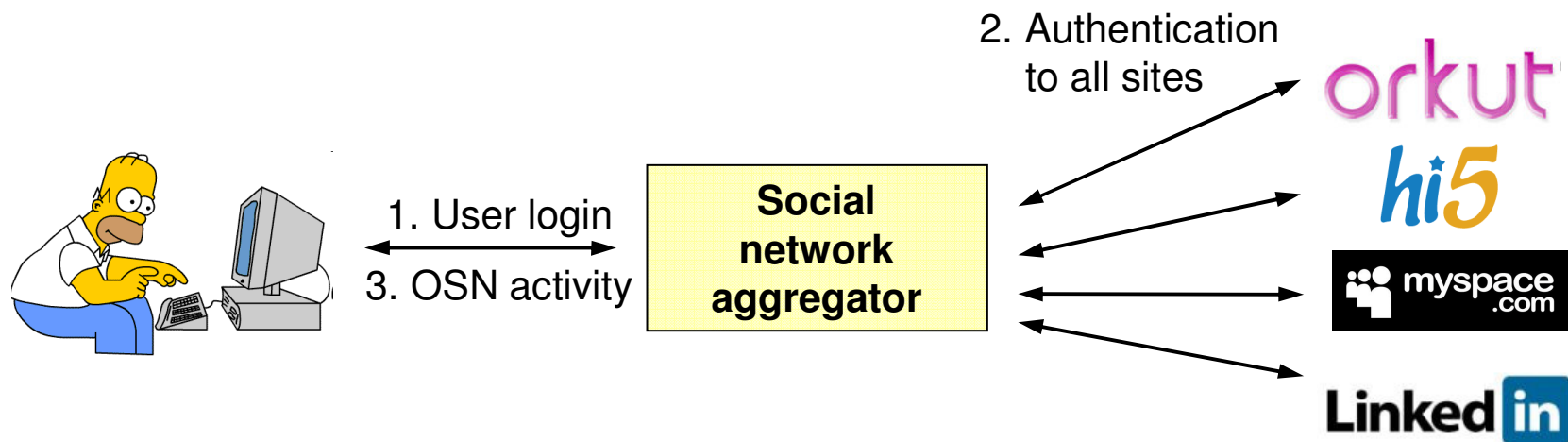
Part2.
Navigation patterns



Part3.
Social interactions

Measurement methodology

We obtained **clickstream** data from a popular online social network aggregator



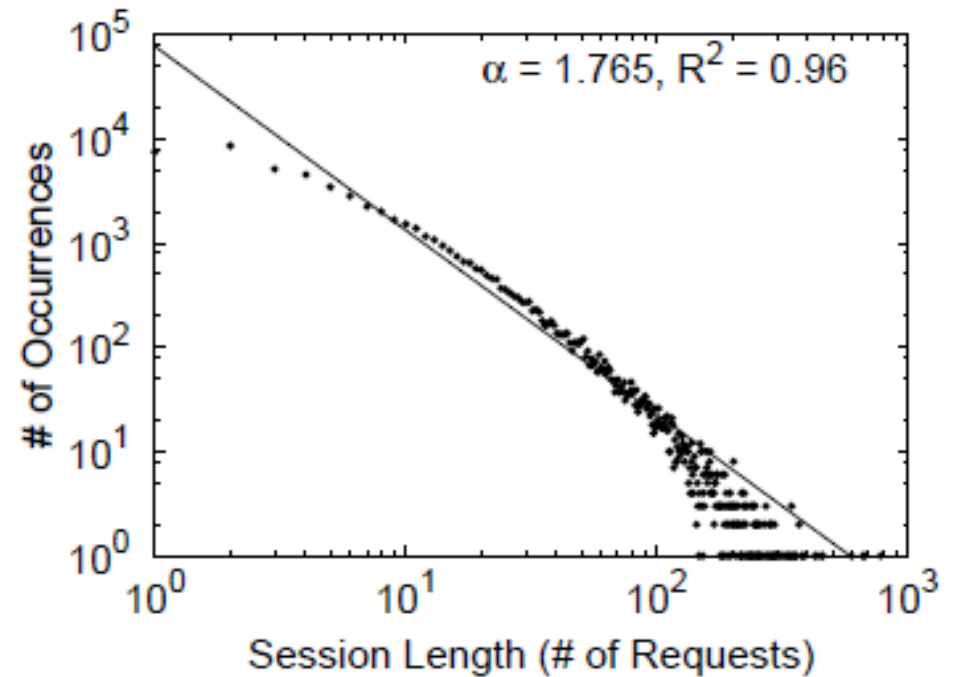
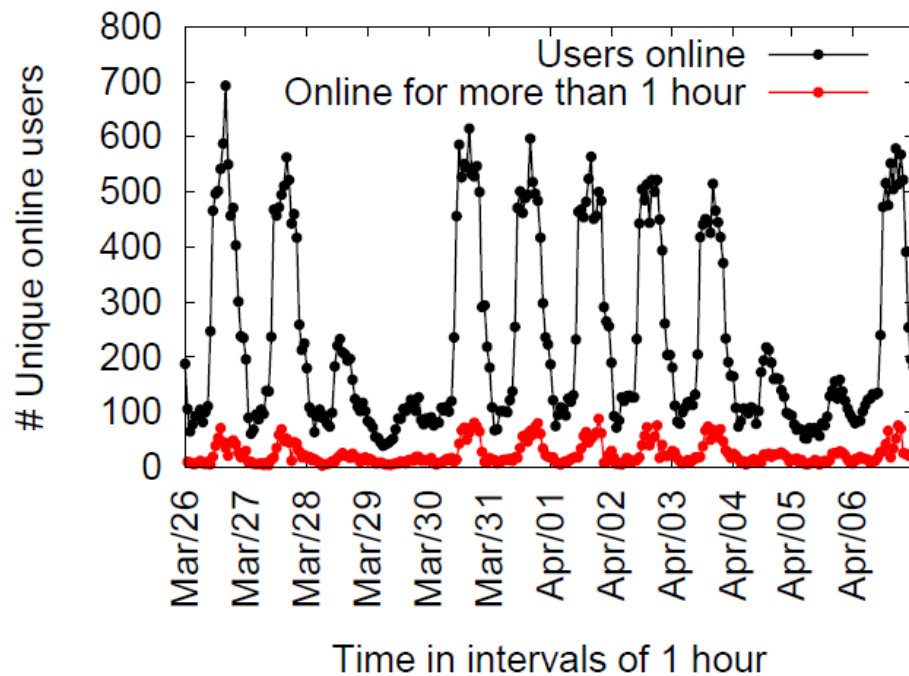
Clickstream data

- 12 days (Mar 26–April 6, 2009)
- HTTP session summaries
 - User ID and session ID, URL, timestamp, IP address, traffic bytes

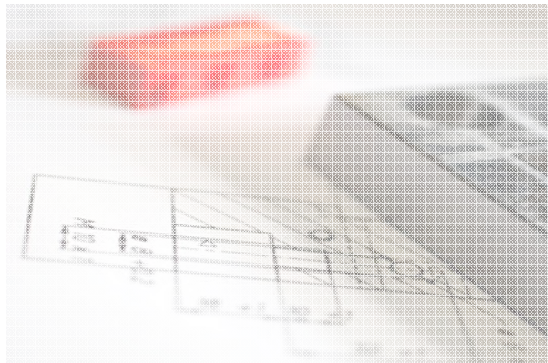
OSNs	# users	# sessions	# requests
Orkut	36,309	57,927	787,276
Hi5	515	723	14,532
MySpace	115	119	542
LinkedIn	85	91	224
Total	37,024	58,860	802,574

- We crawled the list of friends of Orkut users

Session and access characteristics



- Session definition: 20 min timeout, close browser, or logoff
- Provide best fittings for other distributions:
 - inter-session time, inter-request time, session duration



Part1.
Data and statistics



Part2.
Navigation patterns



Part3.
Social interactions

Profiling activities

The image shows a screenshot of the Orkut social network profile for Fabricio Benevenuto. The page is divided into several sections:

- Profile Header:** Includes the name "Fabricio Benevenuto", navigation links (Home, Profile, Scrapbook, Friends, Communities), the user's email "fabricio@dcc.ufmg.br", a "Logout" button, and a search bar.
- Profile Information:** A section titled "Fabricio Benevenuto" with a profile picture, status "offline", and details: "male, married", "Belo Horizonte, Brazil". It includes links for "profile", "scrapbook", "photos", "videos", and "testimonials".
- Profile Preview:** A section titled "This is how my profile will look to myself" with tabs for "scrap", "photos", "photos of me", and "videos". The "scrap" tab is selected and circled with a callout labeled "Scrap".
- Recent Photos:** A section titled "my recent photos (72)" showing a grid of photo thumbnails. A callout labeled "Photos" points to this section.
- Recent Videos:** A section titled "my recent videos (5)" showing a grid of video thumbnails with captions like "espera na janela", "celso e roger 02", "Atlético, Atlético,", and "Dublando Celso & Roger 01".
- Friends:** A section titled "my friends (330)" with a search bar and a grid of friend profile pictures, including names like Rud, Érica, Matheus, Cristiano Arbex, Gisele, Geisy, Frederico, Thiago, and Luiz Henrique.
- Communities:** A section titled "my communities (68)" showing a grid of community logos and names, including "Anatomia da Dança (139)", "Grad001 (28)", "Falo italiano! Parlo italiano! (2,713)", and "UFMG". A callout labeled "Communities" points to this section.

User Activities in Orkut

Profile & Friends

Browse profile, homepage,
list of friends, friend
updates, members of
communities, fans, etc.

Scrapbook

write
browse

Photos

Edit/Organize photos
browse photos, albums,
photos, list of albums,
comments in photos,
photos tagged

Messages

write
browse

Communities

join/leave
post in topics
browse communities,
topics, list of communities,
etc.

Search

Testimonials

write
browse written
and received

Others

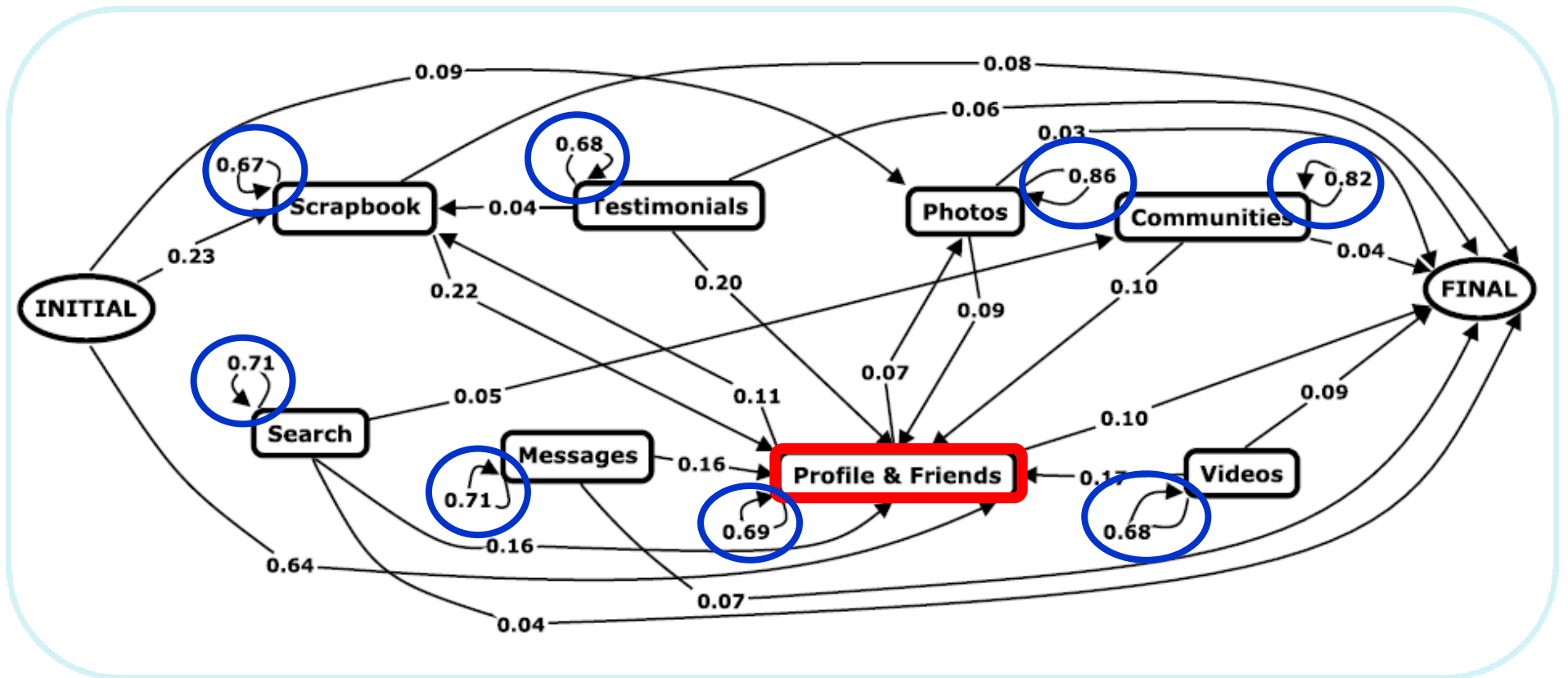
Applications
user settings

Videos

browse list of
favorites
watch a video

Browsing accounts for 92% of all activities!

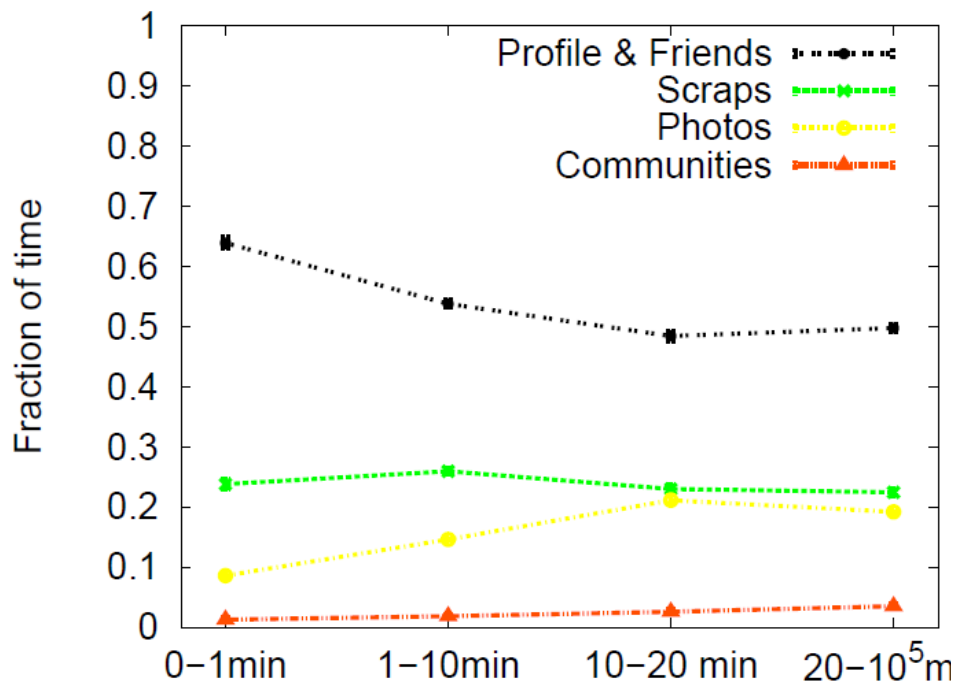
Sequence of activities



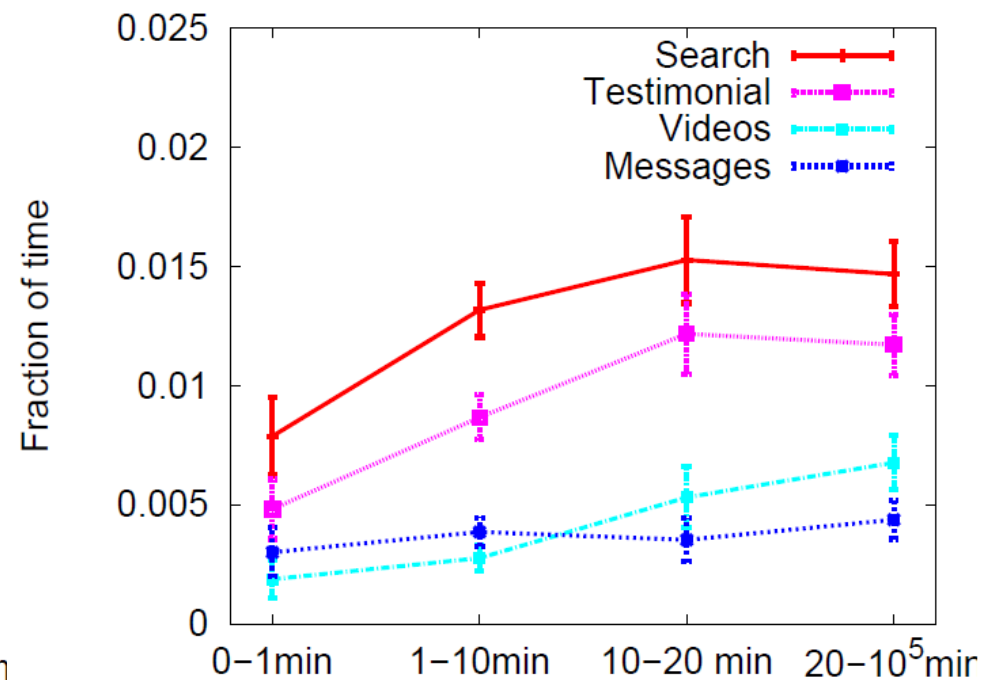
- Profile & Friends plays a central role
- Self-loops are dominant in all categories

Activities and session duration

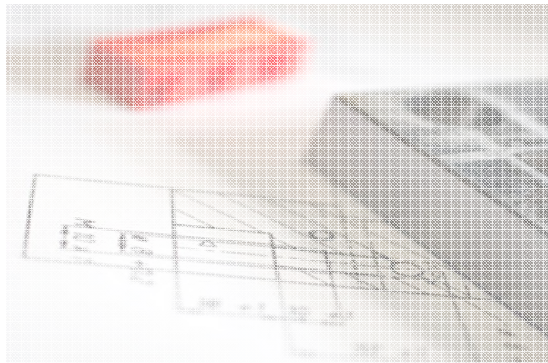
Top-4 activities



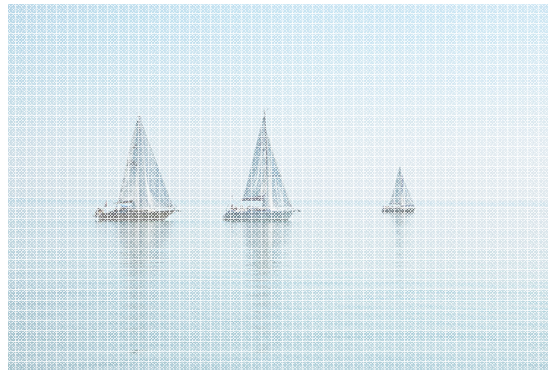
Bottom-4 activities



- Longer sessions usually involve diverse activities
- Profile, scrapbook, and photos are the most popular activities, regardless of the session duration



Part1.
Data and statistics



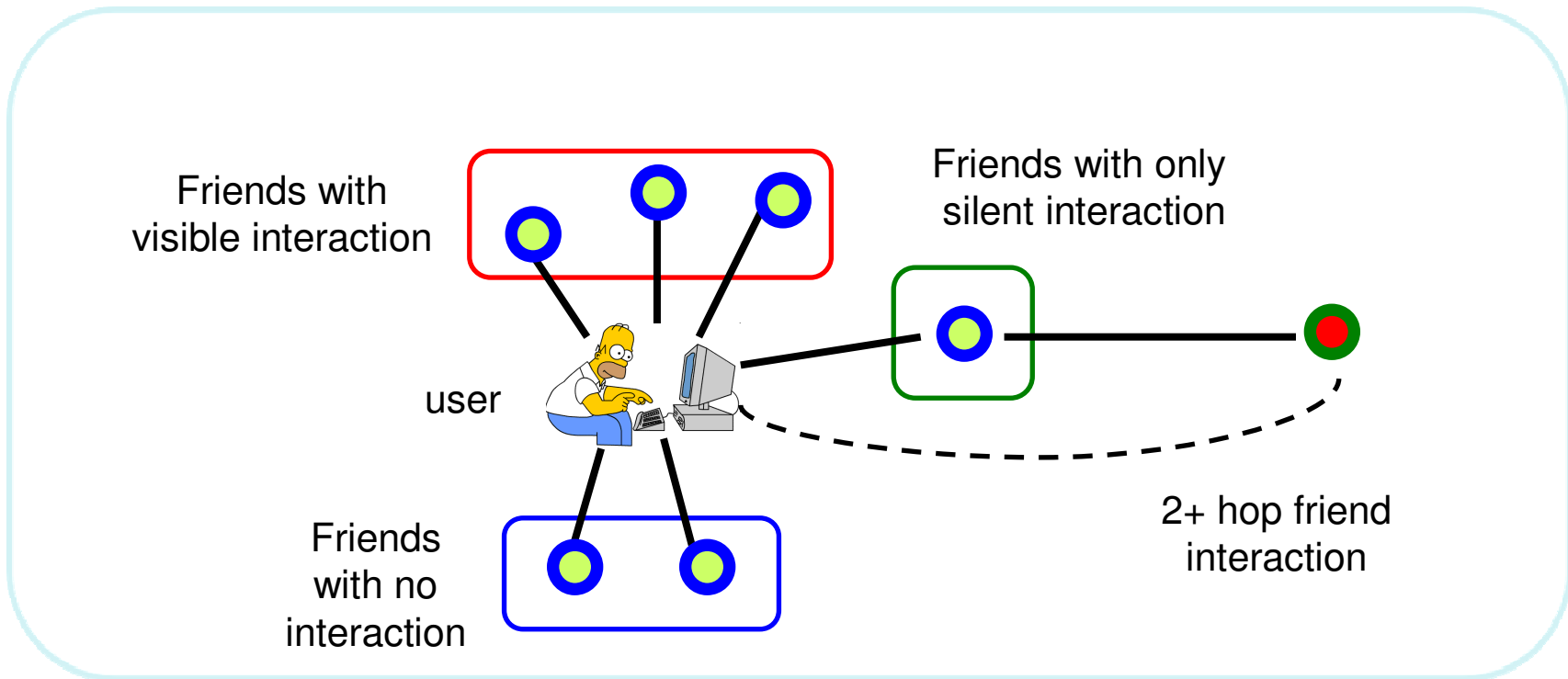
Part2.
Navigation patterns



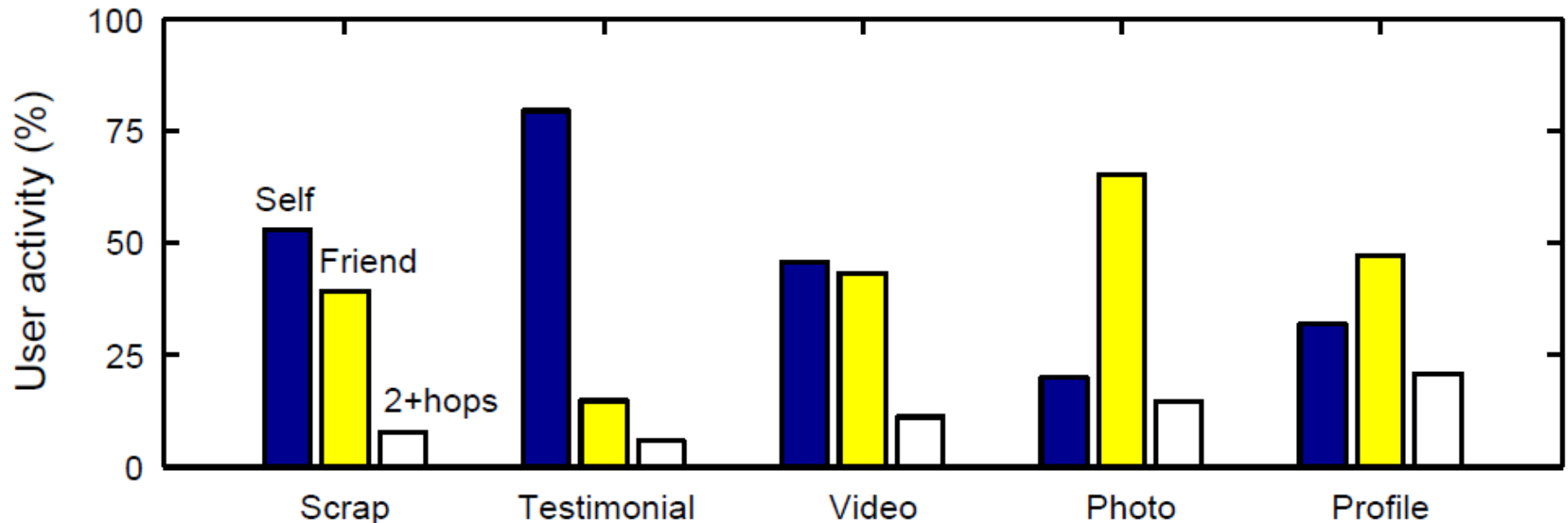
Part3.
Social interactions

Social interactions

- **Visible interactions:** Write messages, scraps, testimonials
- **Silent interactions:** Browse profiles, pictures, etc.

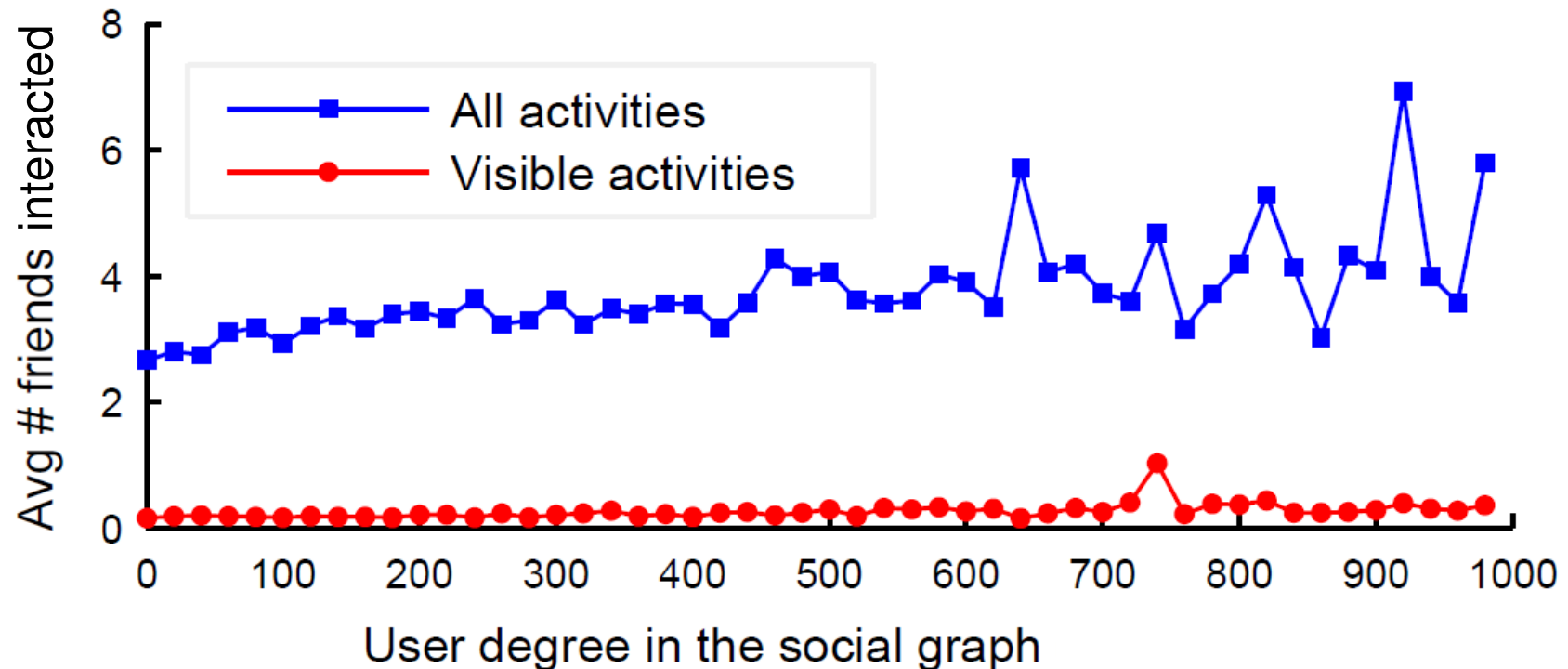


Interaction along the social distance



- Users access their 1-hop friends' pages most frequently
- Interaction with 2+ hops friends is not negligible
 - Usually associated with content discovery through social links

Number of friends a user interacts with



- Degree of interaction increases by an **order of magnitude** when incorporating silent interactions
- 85% of the active users showed **only silent interactions!**

Conclusions

- First study of OSN workload considering both visible and silent social interactions
- Clickstream-based analysis highlighted new insights on user behaviors in OSNs
- Statistics and best fitting distributions of user sessions can be used to generate synthetic workloads

Questions?

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