Advanced Computer Graphics CS 525M: Characterizing Web Use on Smartphones

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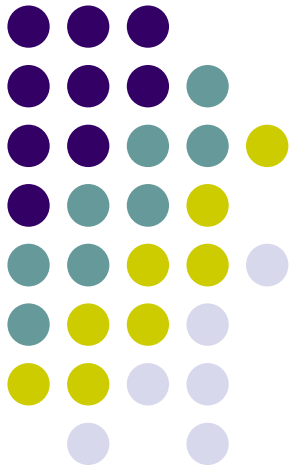
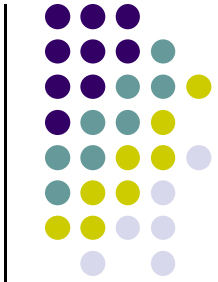
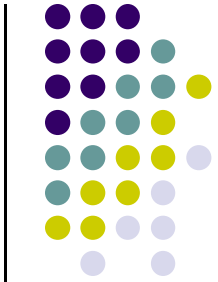


Motivation



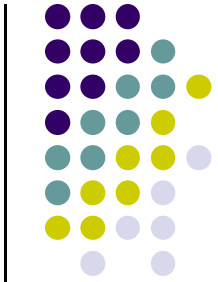
- Web is a resource used by over two billion people worldwide
- A substantial amount of research has characterized web use on PCs.
- These studies has not applied to web use associated with smartphones.
- More and more people access the web frequently through their smartphones.

Goal



- Characterize web interactions with smartphones using a deliberately naturalistic and longitudinal methodology.
- Monitor and track usage of internet access over smartphones.

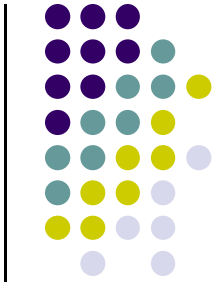
Related Work



- Noted some differences among smartphones and PCs.

- Smartphones have been used more and more frequently.

Methodology



- Logging：use logging technologies to collect data
- Data Collection
  - Function
    - 24 students participated
    - given iPhones to use as their only mobile phone for a year
    - All interactions were recorded unobtrusively
  - Information
    - Custom logger record every URL visited both on the users' browsers and application usage.
    - Logs include date, time, Cell ID, duration of the interactions

Methodology

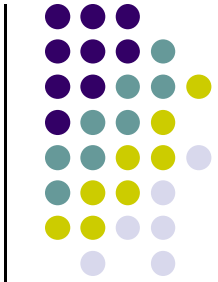
- Data Analysis
  - Our interest is internet usage, remove applications which do not depend on internet

Removed		Kept	
SMS	Voice Phone	Email	Maps
Non-Web Games	Camera	Facebook	Weather
Settings	iPod	Web Games	News

Table 1. Some NIAs and categories of NIAs analyzed along with several we removed.

NIAs: native internet applications

Methodology



- Organized web browser logs by sessions.

  Sessions are defined as when the browser was launched and then closed.

- Revisitation rates:

$$\textit{Revisitation rate} = (\text{total visits} - \text{unique locations}) \,/\, \text{total visits}$$

  unique location: total number of distinct NIAs, sites or pages accessed by each user

- Examine both physical revisitation and virtual revisitation.

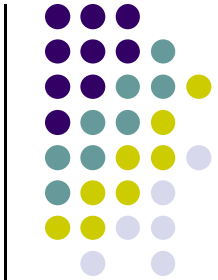
Results

- Browser Visits
  - Low total number of queries per search session.
    - Low time for navigating + long page loading times
  - Browsers are accessed less frequently.
    - Rely on NIAs + not access static pages repeatedly

	PC Studies	iPhone
Mean URL visits per day/user	7.6 - 258.5 [24]	0.4 - 20
Site vocabulary	84 – 2,127 [24]	27 – 543
Mean session duration	476.4 sec. [36]	105.9 sec.
Page visits/session	17.7 [36]	6.1
Query rate	12.5% [36]	56.3%
Queries/session	4.3 [36]	2.1
Site revisitation rate	70% [24]	90.3%
Page revisitation rate	45.6% [24]	25.3%

Table 2. Browser comparisons between platforms.

Results



- Nature of the Task
  - A greater distinction between page and site revisitation rates compared to the PC:
    - page revisitation rate was lower than site revisitation.

Results

- Nature of the Task
  - Categorized these pages as four types
  - Most re-visit page are gateway or login pages.

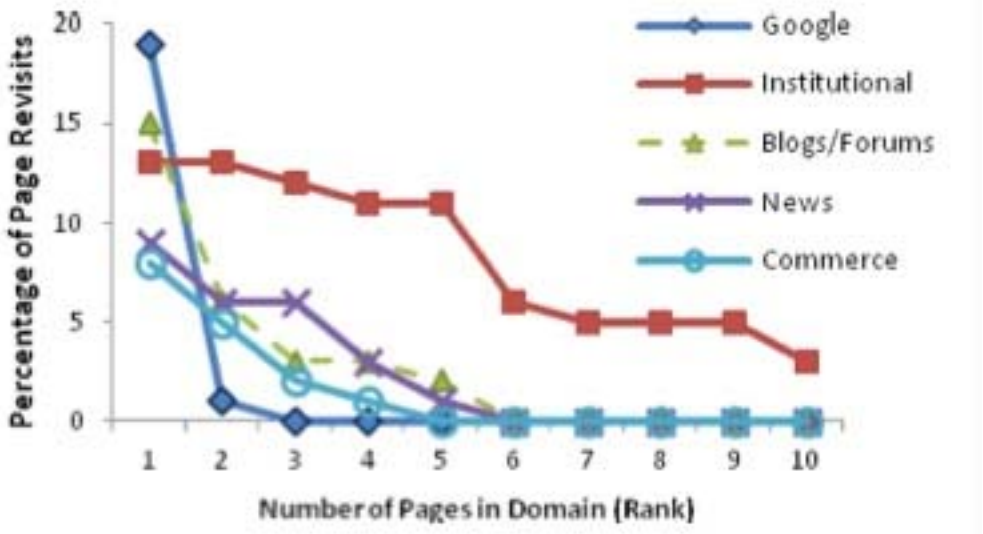
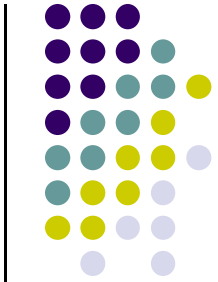


Figure 1. Page revisits by type of site [after 24].

Results



- Temporal Patterns and Revisitation Strategies
  - Fragmented browsing across interruptions also resulted in page revisiting.
  - Longer-term revisits generally occurred through navigating from top-level pages accessed through search.
  - Bookmarks were not used frequently.

Results

- Use of Native Internet Applications

	Mean	SD	Min	Max
Visits/Active Day	17.40	8.30	1.00	36.00
Vocabulary	124.63	106.17	31.00	475.00
Revisitation Rate	0.97	0.02	0.91	0.99
Hours/Active Day	2.02	1.21	0.26	4.69
NIAs Visited Once	33.00	41.43	0.00	185.00
% Search App Use	0.002	0.004	0.00	0.02
% Visits in Top 10	60.39	13.15	32.39	89.84

Table 3. Summary and variance statistics for NIA use.

Result

- Use of Native Internet Applications

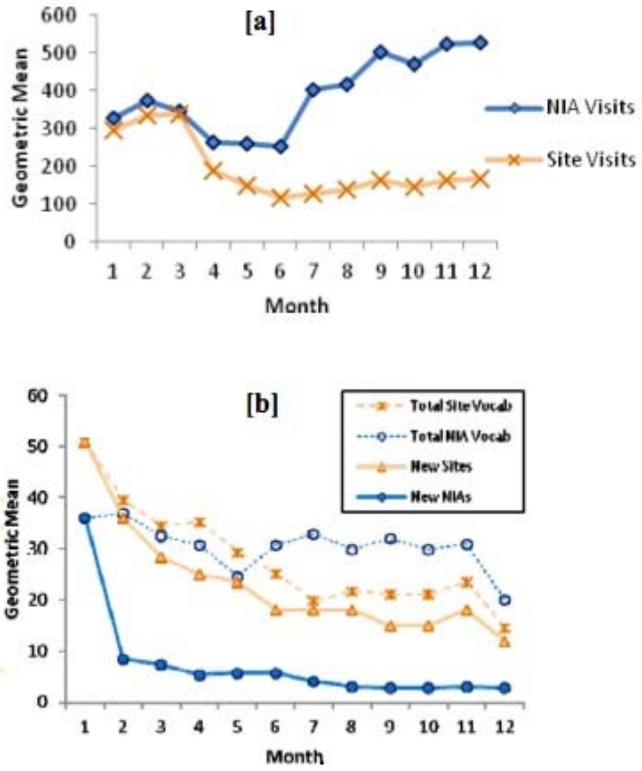
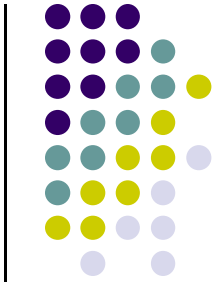


Figure 2. Number of (a) visits, (b) total vocab and new content accessed through NIAs and the browser by month.

Result



- Use of Native Internet Applications
  - NIAs were visited more often than websites
  - The number of new NIAs were severely lower than websites

Result

- Visiting and Revisiting Physical Locations
  - Location re-visitation was at 90%
  - web based re-visit of roughly 20%

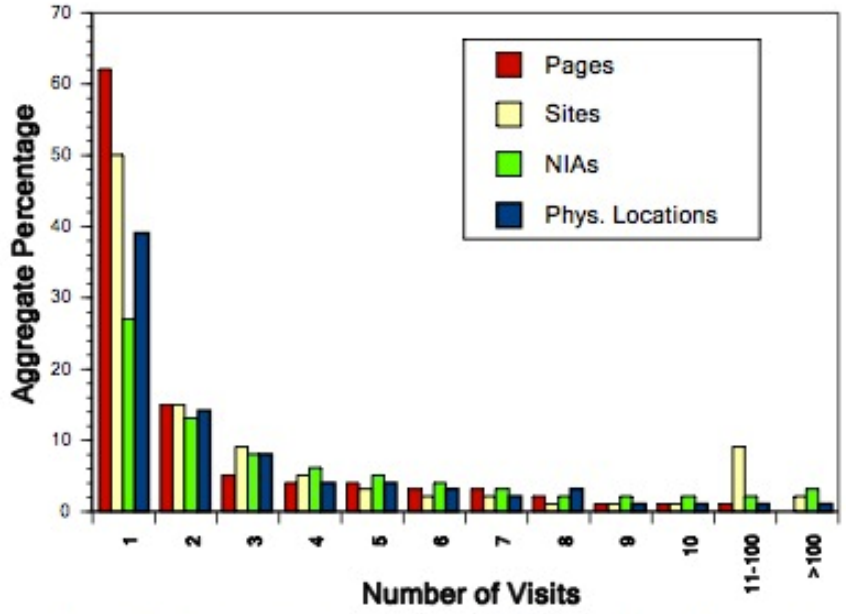


Figure 3. Aggregate percentages of pages, sites, NIAs and physical locations (Cell IDs) by their number of visits.

Result

- User Differences in Accessing the Internet
  - Examine the large user variance
  - Developed NIA-to-site indices based the equation:

$$\text{NIA-to-site index} = (\text{NIA visits} - \text{site visits}) / (\text{NIA visits} + \text{site visits})$$

    - >0 : greater use of NIAs compared to sites on the browser
    - <0 : greater use of the browser compared to NIAs.
    - =0 : accessed both NIAs and sites via browser at the same proportion

Result

- User Differences in Accessing the Internet

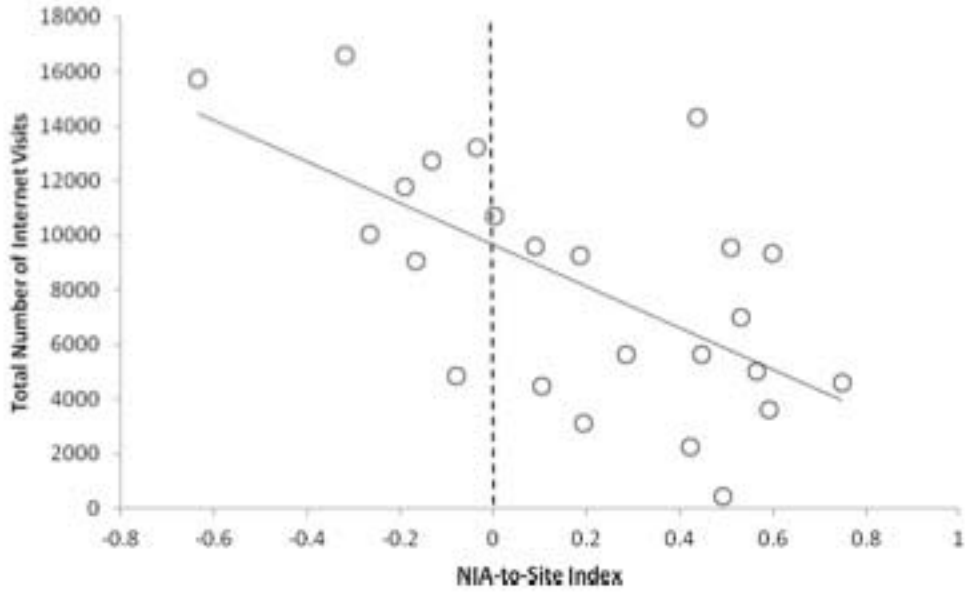
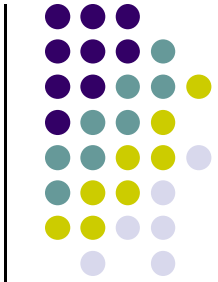


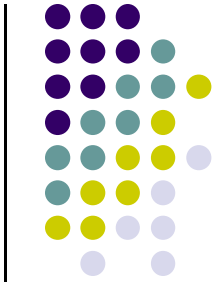
Figure 4. Scatter plot of total visits by NIA-to-site index values.

Discussion



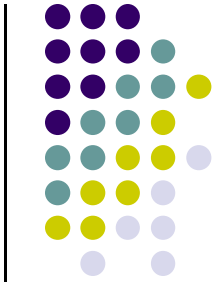
- This study is realistic due to unobtrusively logger collection.
- Differences between PC and smartphone.
- Different types of smartphone users
- Based on above, provide design recommendation
- Limitations:
  - Small sample size
  - Examine only the use of iPhones
  - PC studies are older

Conclusion



- Established behavioral patterns associated with browsing, NIA use and physical locations.
- Found these differences were stable across virtual and physical location visiting with smartphones.
- Generally, this paper did not provide any new technology or new idea
- Offer insight into future development.

References



- *http://erikkatzen-tamuchi.blogspot.com/2012/09/paper-reading-4-characterizing-web-use.html*