New-tab page recommendations strongly reinforce habitual web-browsing behavior

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Publication

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WebSci is a top conference in the field of Human-Computer Interaction/Information Science/Web modeling and inference

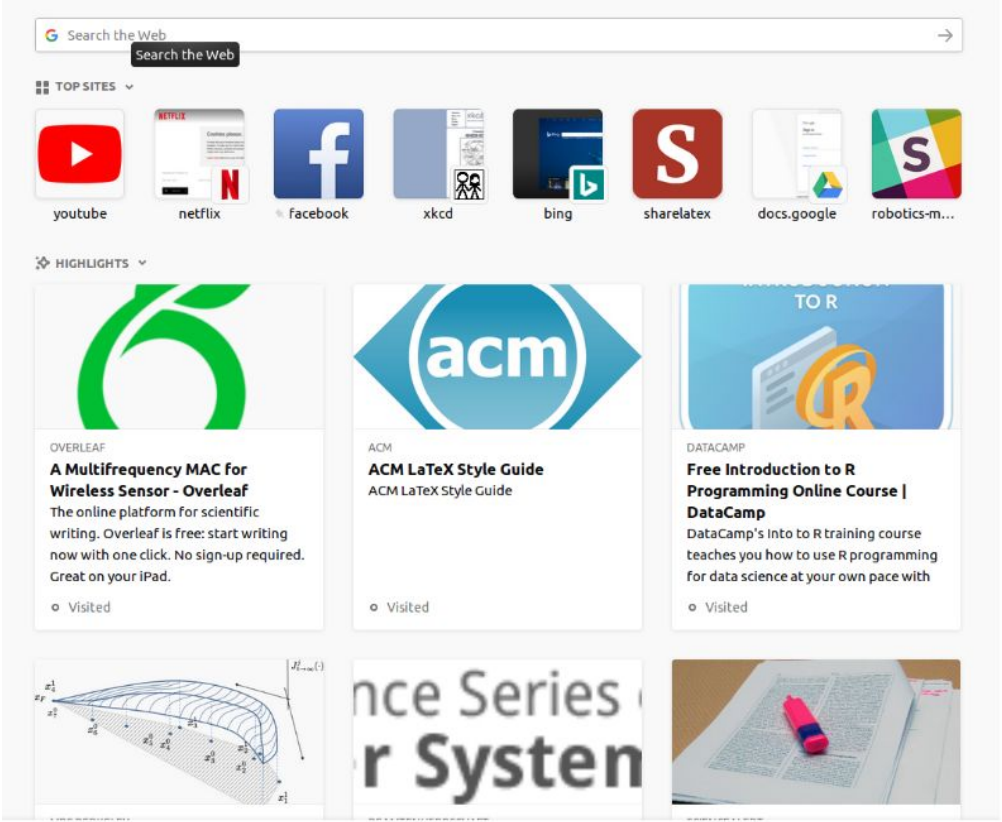
I will be presenting our paper in Boston, during the first week of July

Timeline

This was a large project that involved designing an application (a web extension), collecting web browsing data of 3 months duration from around 100 consenting volunteers, simulating a model of the web, and drawing statistically significant inferences

I completed this project under Prof. Nisheeth Srivastava's guidance over two semesters and one summer

Motivation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Motivation

High level -- To analyze how our activities on the internet through conventional UIs is affecting our mental faculties like curiosity and the urge for exploration

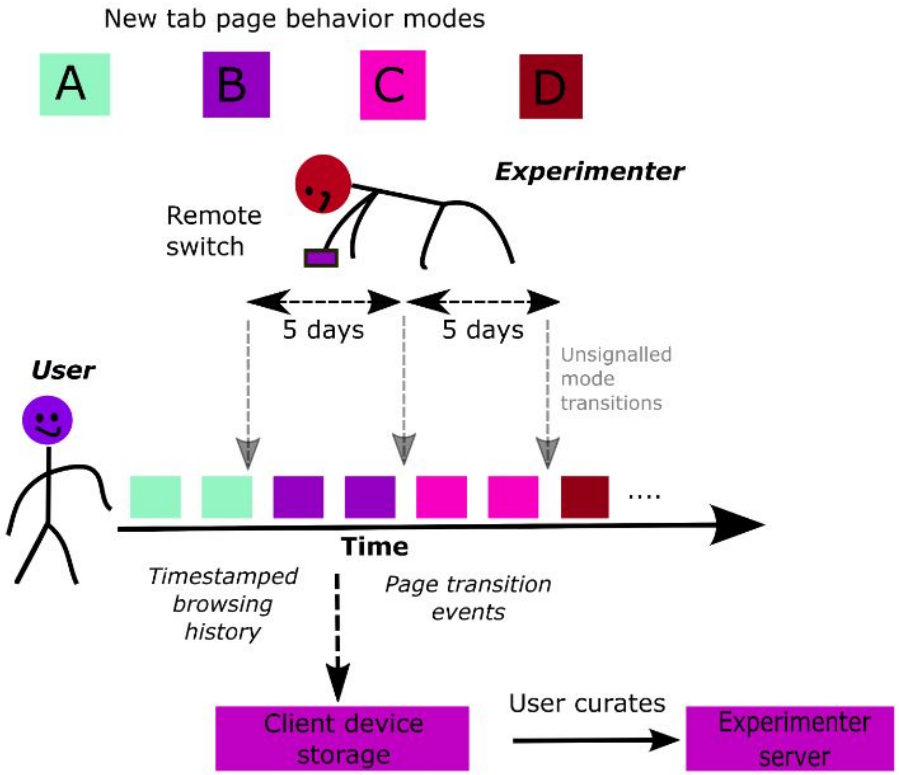
Low level -- To understand the impact of passive recommendations on exploration propensity in the internet

Motivation

Our study is a study of an extremely general version of the filter bubble hypothesis

Filter bubble -- self reinforcing nature of web recommendations trap users in personalized ideological bubbles

Design


New tab page behavior modes
A
B
C
D
Experimenter
Remote switch
5 days
5 days
Unsignalled mode transitions
User
....
Time
Timestamped browsing history
Page transition events
Client device storage
User curates
Experimenter server

Specifics

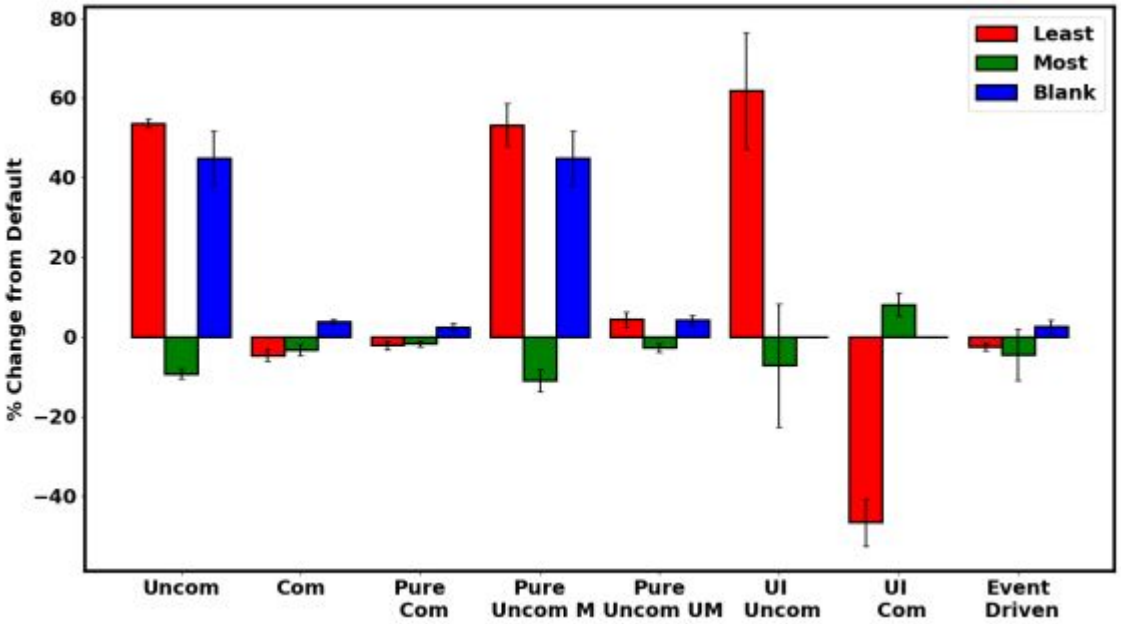
We displayed new tab page recommendations as per different schemes - most visited websites, least visited websites, blank UI, Mozilla's default frecency (frequency + recency) algorithm

Observed the variation in number of unique sites visited by users, number of times "uncommon" websites are visited by users (per UI scheme)

Inference

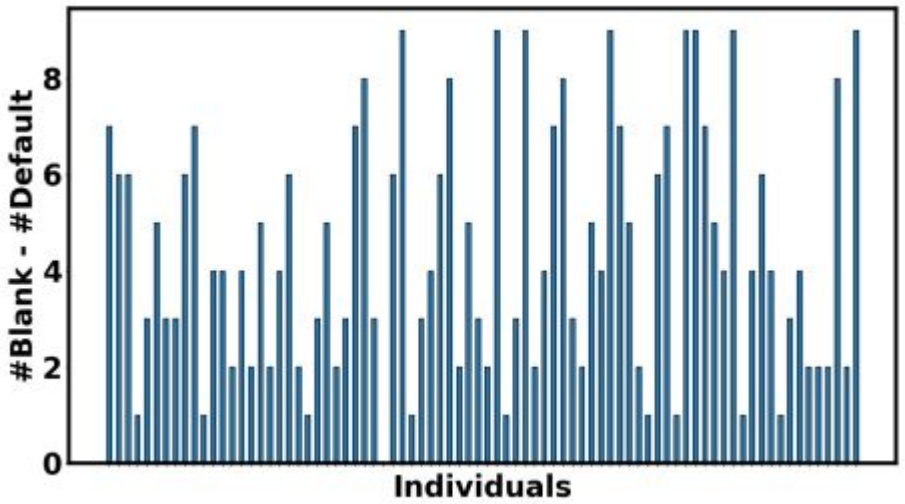
Less uncommon websites visited in "Blank UI" mode as compared to the default mode

So, the conventional UI of browser new tab page suppresses exploration!



Inference

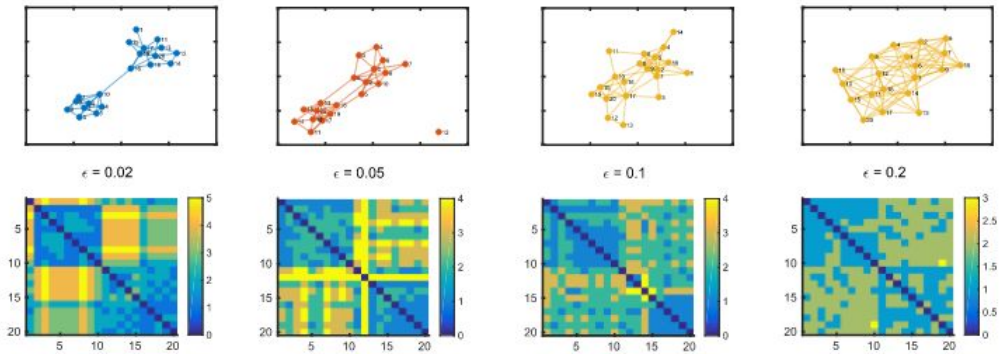
Seen at the level of individuals, it is evident that the observed phenomena is exhibited by "ALL" our participants and is not a result of cumulative analysis



Inference

Modeled web browsing behavior for an individual agent as a random walk on a graph

Observed super exponential decay of first hitting time with respect to exploration



Conclusion

I was fortunate to be a part of the entire project pipeline, right from conceiving the idea to publishing a paper!

Considering how ubiquitous computers and the internet have become, this effect would span even mobile devices

Based on our results, people should decide for themselves whether the convenience of clicking through to commonly visited web pages is worth the potential curtailment of their curiosity.