

TDTS21: Advanced Networking

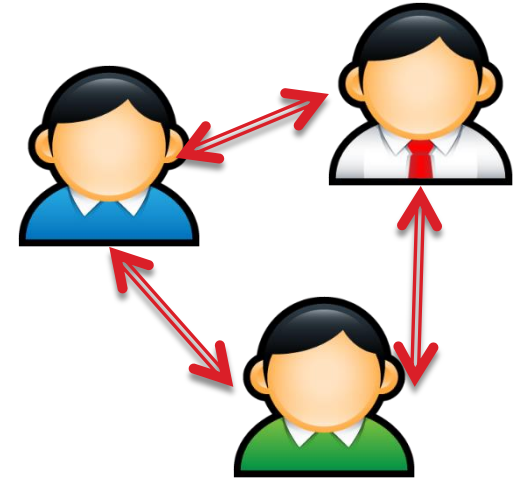
Lecture 8: Online Social Networks

Based on slides from P. Gill
Revised 2015 by N. Carlsson

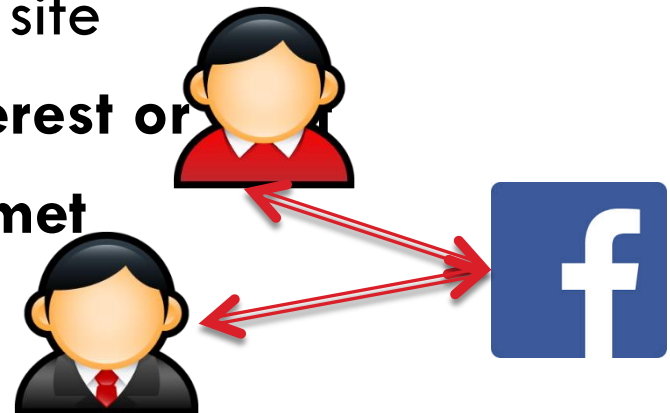
What are (online) social networks?

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- Social networks are graphs of people
 - ▣ Graph **edges connect friends**
 - ▣ **'Friend'** has different implications
 - ▣ How hard is it to be Facebook 'friends'?



- Online social networking
 - ▣ Social network hosted by a Web site
 - ▣ Friendship represents **shared interest or**
 - ▣ Online friends **may have never met**



What are online social networks used for?

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- Popular for sharing content
 - ▣ Photos (Flickr), videos (YouTube), blogs (LiveJournal), profiles (Facebook, Orkut)
- Fixed broadband (Sandvine Q1 2014)
 - YouTube 5.5% upload, 13.2% down
 - Facebook 2.2% upload, 2.0% down
- Popular with users on the go
 - ▣ Mobile (Sandvine Q1 2014)
 - YouTube 3.8% up, 17.6% down
 - Facebook 27.0% up, 14.0% down

Why are social networks interesting?

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- Popular way to connect
 - ▣ Estimated 1.32B users online each day
 - ▣ Average American spends 40 minutes/day on the site
- Changing the flow of information
 - ▣ Formerly few “writers” many “readers” online
 - ▣ Now anyone can write!
 - ▣ What does this mean for Internet traffic?
- Important in regions with strict media controls
 - ▣ E.g., Iran, Egypt using social media platforms to get word out in times of unrest
- Useful in times of disaster

Notable incidents ...

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WIRED

GEAR SCIENCE ENTERTAINMENT BUSINESS SECURITY DESIGN OPINION MAG

performance made with IBM Cloud

CNN.com /technology

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Hot Topics » Don't Click on That » iPhone » Facebook » Solutions » Internet » Science » Planet In Peril » more topics »

Life Women F
nce Scotland Roya

updated 2:03 p.m. EDT, Fri April 25, 2008

Student 'Tweets' his way out of Egyptian jail

READ

VIDEO

SLIDESHOW

By Mallory Simon
CNN

(CNN) -- James Karl Buck helped free himself from an Egyptian jail with a one-word blog | phone.

Buck, a graduate student from

send out short, burst like updates to a group of friends has proved to be an

invaluable tool for distributing information

lections

it election
ud Ahmadinejad.

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Iran Protest Movement

By Lev Grossman | W

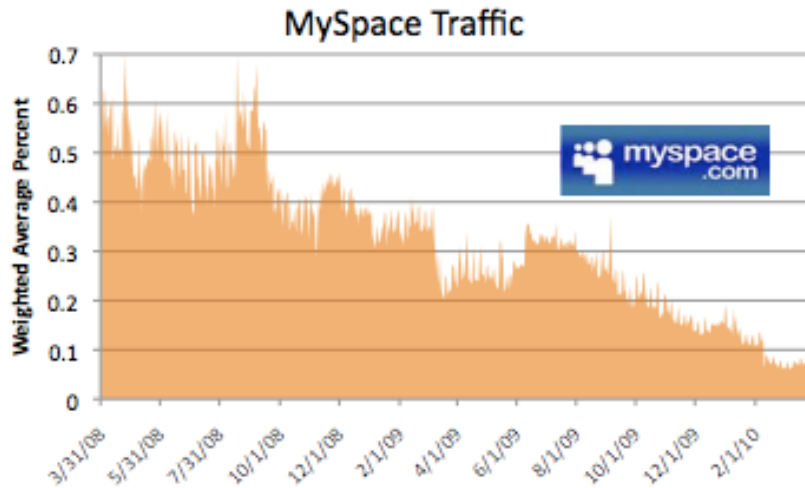
Like 10

The U.S. State Department has expressed interest in the maintenance of the Iranian start-ups. But over the past few days, it has reached out to Twitter to help with a network upgrade that is expected to be completed tonight. The reason? To help Iranian protesters using the service during the election that took place on April 24. The upgrade to 2 p.m. EDT on April 25, 1:30 a.m. Tehran time.

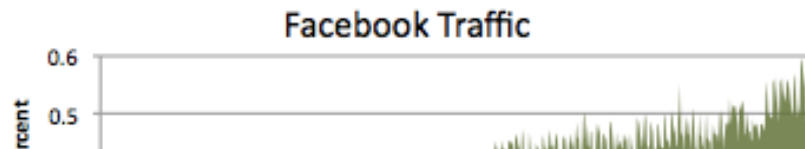
(Read "The Iran Election")

Not just a social phenomenon...

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Facebook now contains photo and video
→ Content delivery challenges!



YouTube is a large fraction of Google's traffic!



Understanding properties of these networks is important to understand how we build systems to support them!

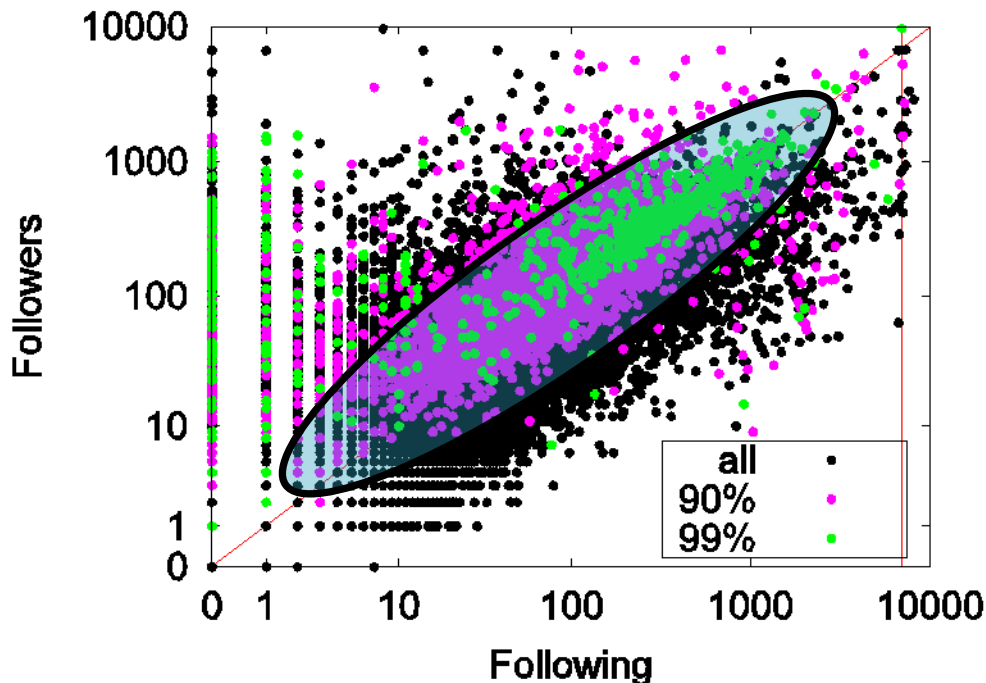
A few words about “Rich get richer” and “Preferential attachment”

A few chirps about Twitter

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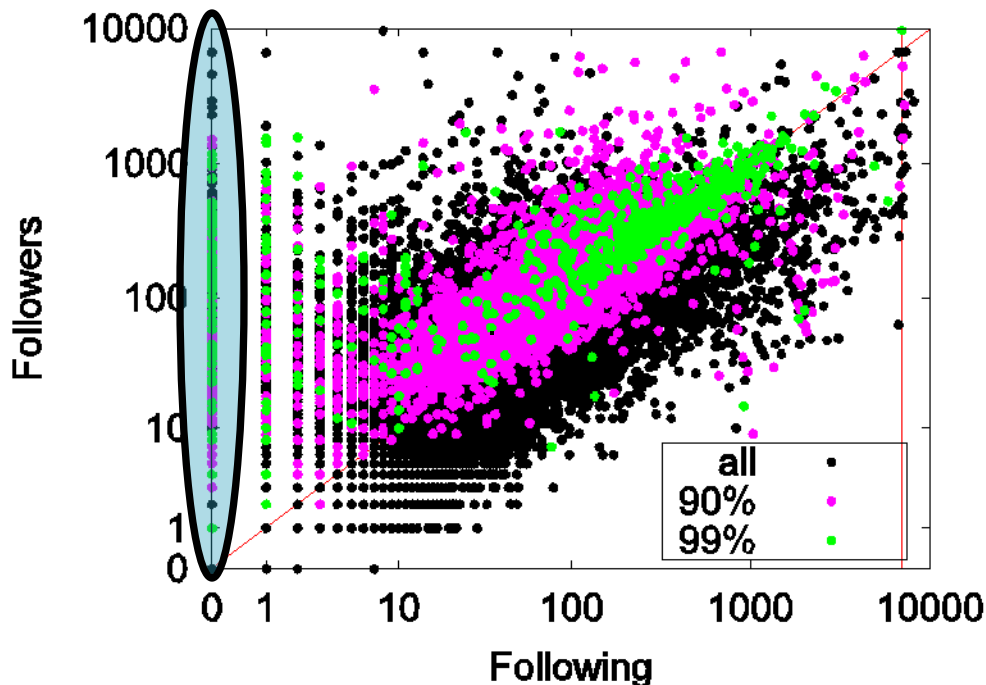
- ... by Krishnamurthy, Gill, and Arlitt

Aside: User relationships on Twitter



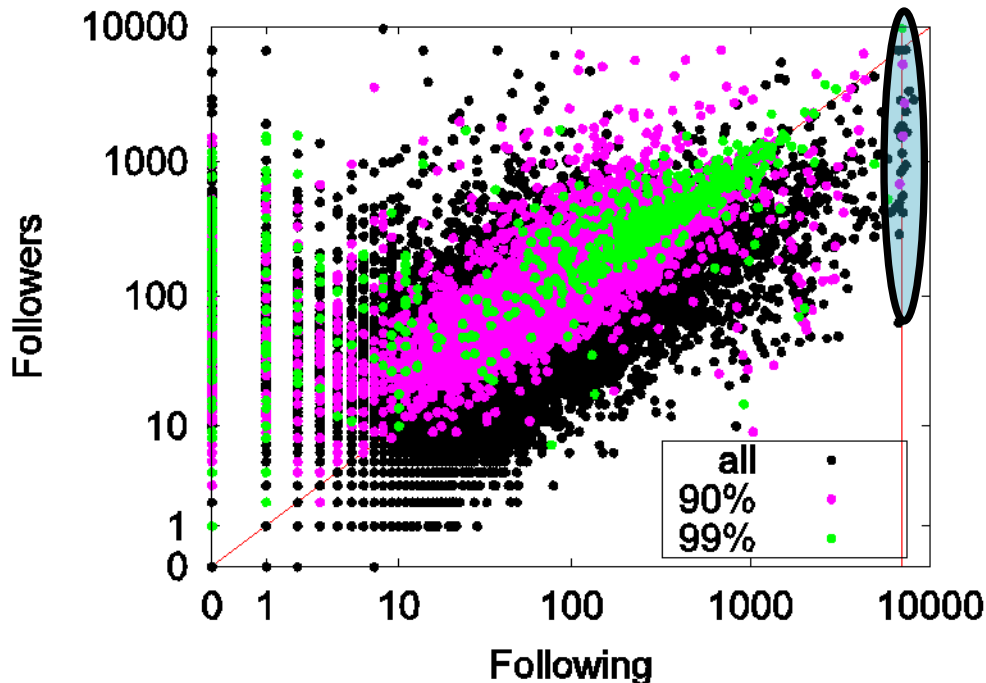
- **Acquaintances**
- Similar number of followers and following
- Along the diagonal
- Green portion is top 1-percentile of tweeters

Aside: User relationships on Twitter



- **Broadcasters**
- News outlets, radio stations
- No reason to follow anyone
- Post playlists, headlines

Aside: User relationships on Twitter



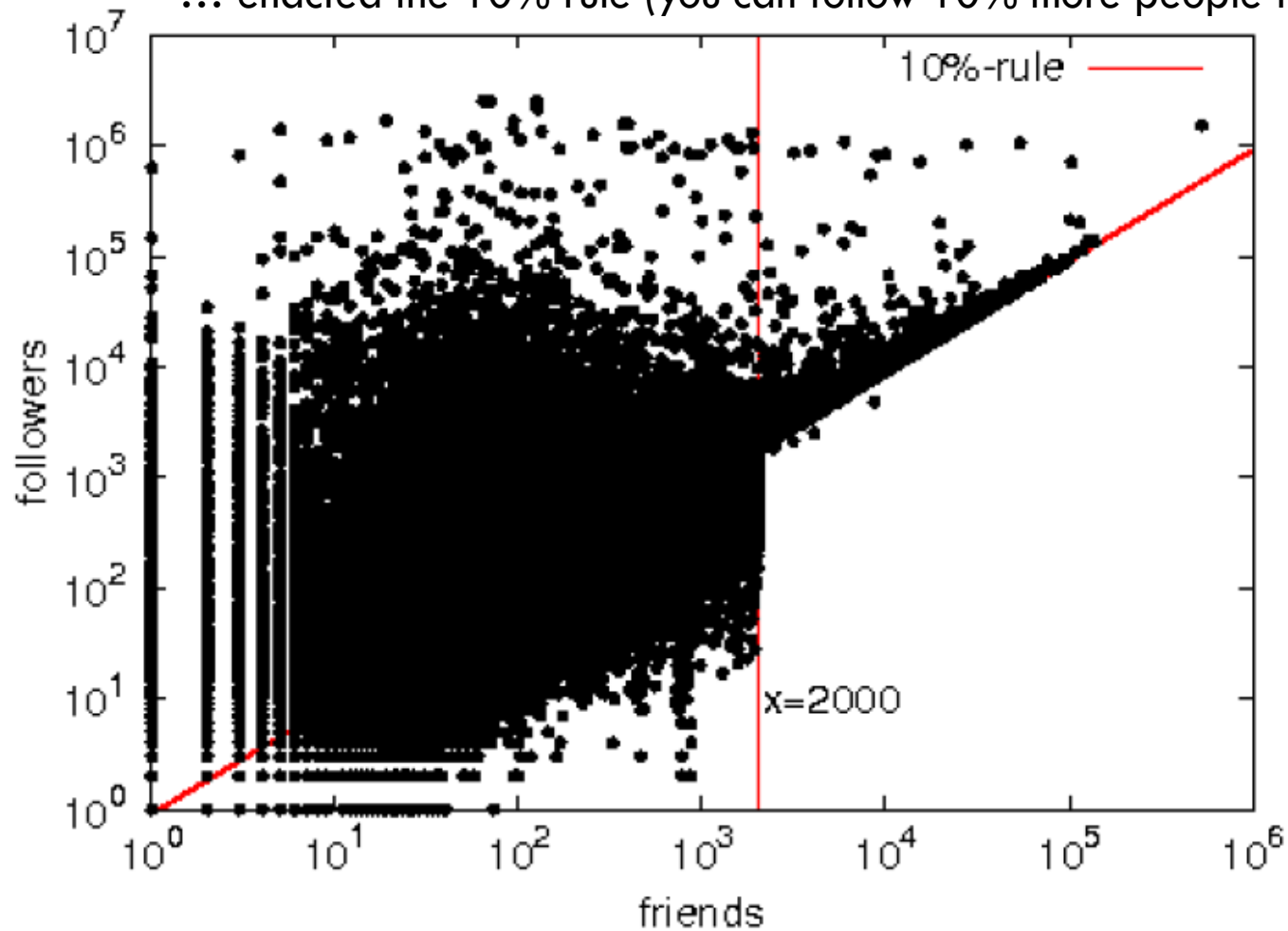
- ❑ **Miscreants?**
- ❑ Some people follow many users (programmatically)
- ❑ Hoping some will follow them back
- ❑ Spam, widgets, celebrities (at top)

Aside: User relationships on Twitter

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Twitter noticed the miscreants...

... enacted the 10% rule (you can follow 10% more people than follow you)



Evolution of an Online Social Aggregation Network: An Empirical Study

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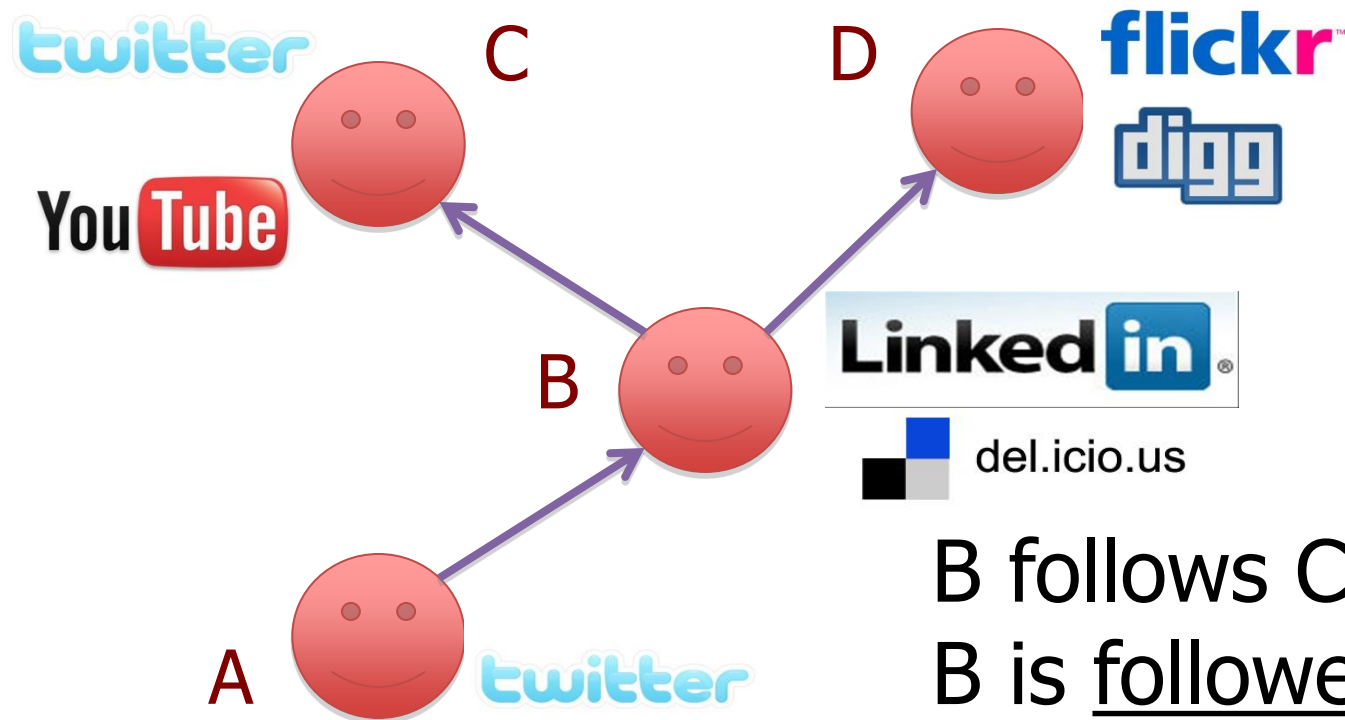
□ by Garg et al.

- An **online social service aggregator**
- A glimpse into service popularity and usage (although some bias)
- Link formation:
 - ▣ Can preferential attachment explain link formations? Any impact of node age?
 - ▣ What influence does factors such as proximity and group affiliation have in link formations?

friendfeed

[Garg et al. IMC '09]

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B follows C
B is follower of C
C is friend of B

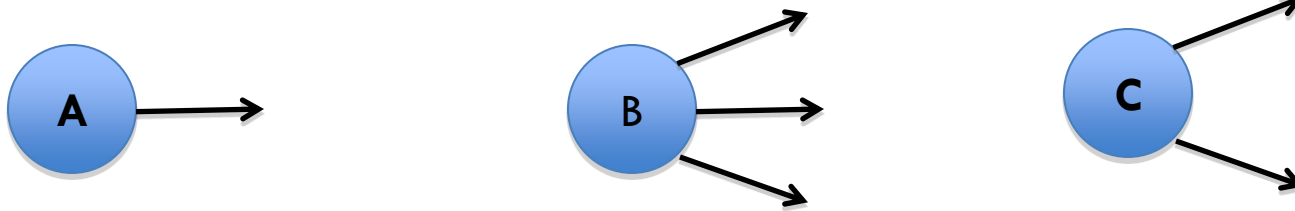
Preferential Attachment (PA)

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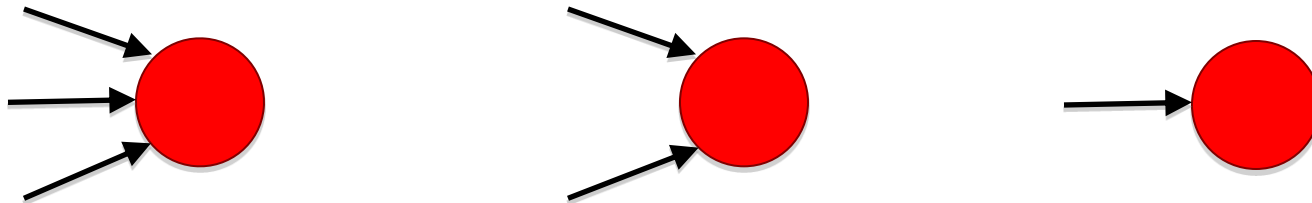
□ Does PA explain the observed data ?

□ p_i proportional to k_i^α

□ For **source node selection** (Out-degree, $\alpha = 0.8$)



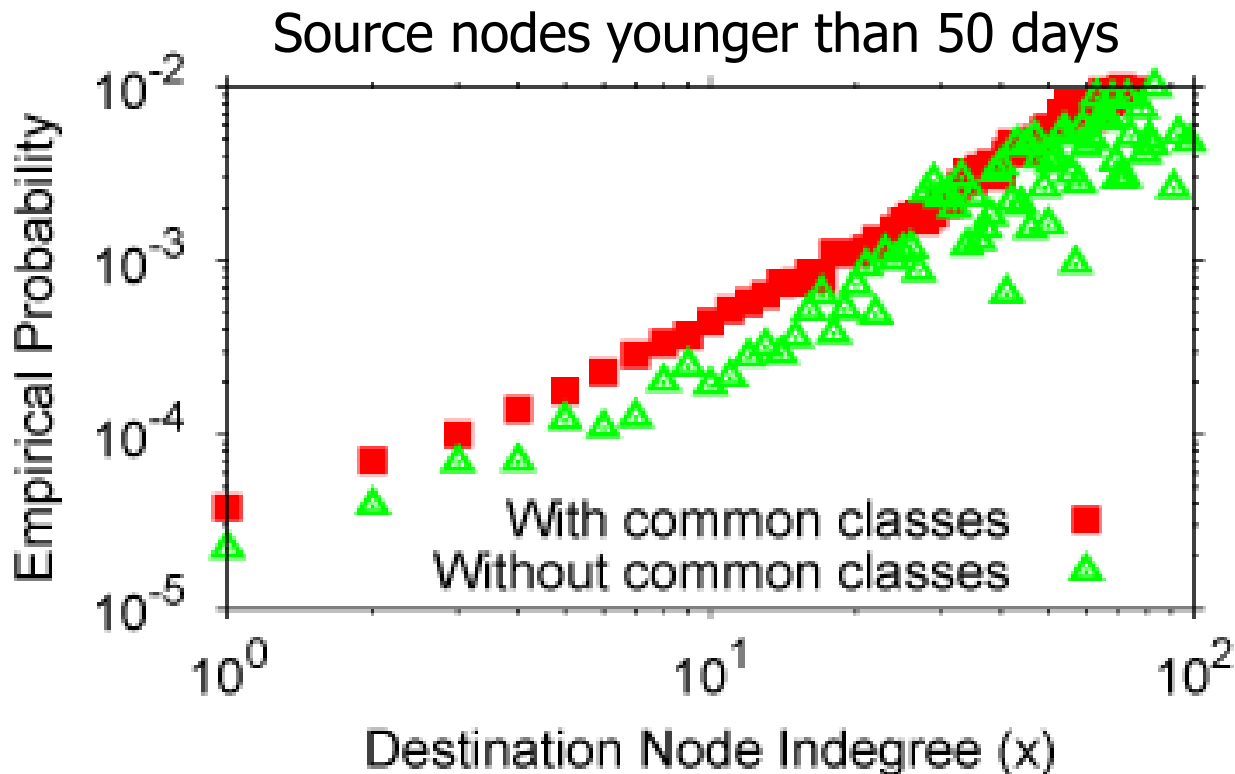
□ For **destination node selection** (In-degree, $\alpha = 0.9$)



Group Affiliation & Link Formation

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- We considered subscription to common services as an indicator of common interest.



OSNs: Wrap up

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- Many different types of OSNs
 - ▣ Photos, video, profile-based
- Some extremely popular **source of much Internet traffic**
 - ▣ Facebook, YouTube
- New ones emerging
 - ▣ Instagram, snapchat
- Old ones fading
 - ▣ MySpace, Friendster
- Studying their properties can inform **how we build networks and systems to support them!**