

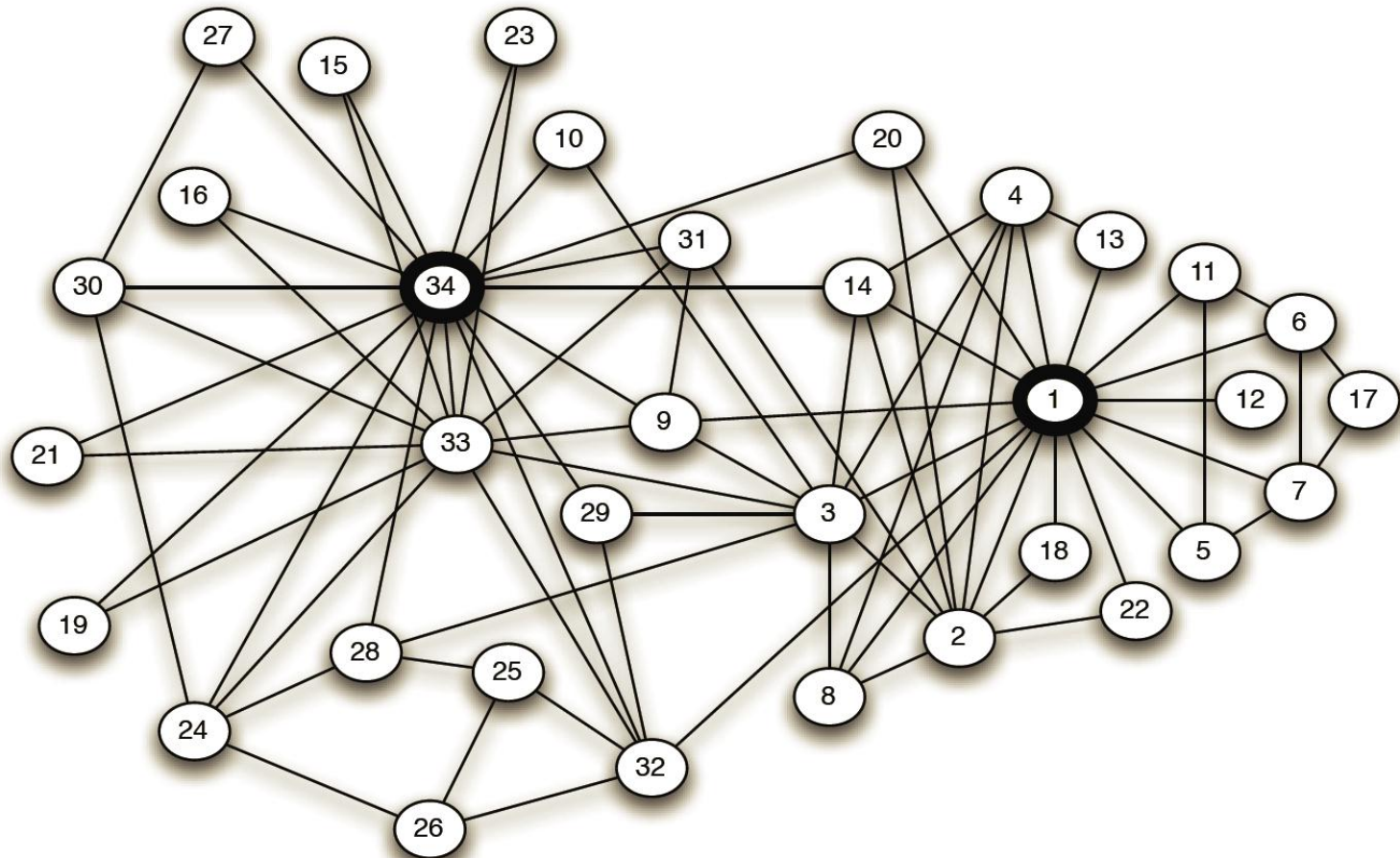
Understanding social networks with F#

Evelina Gabasova
@evelgab

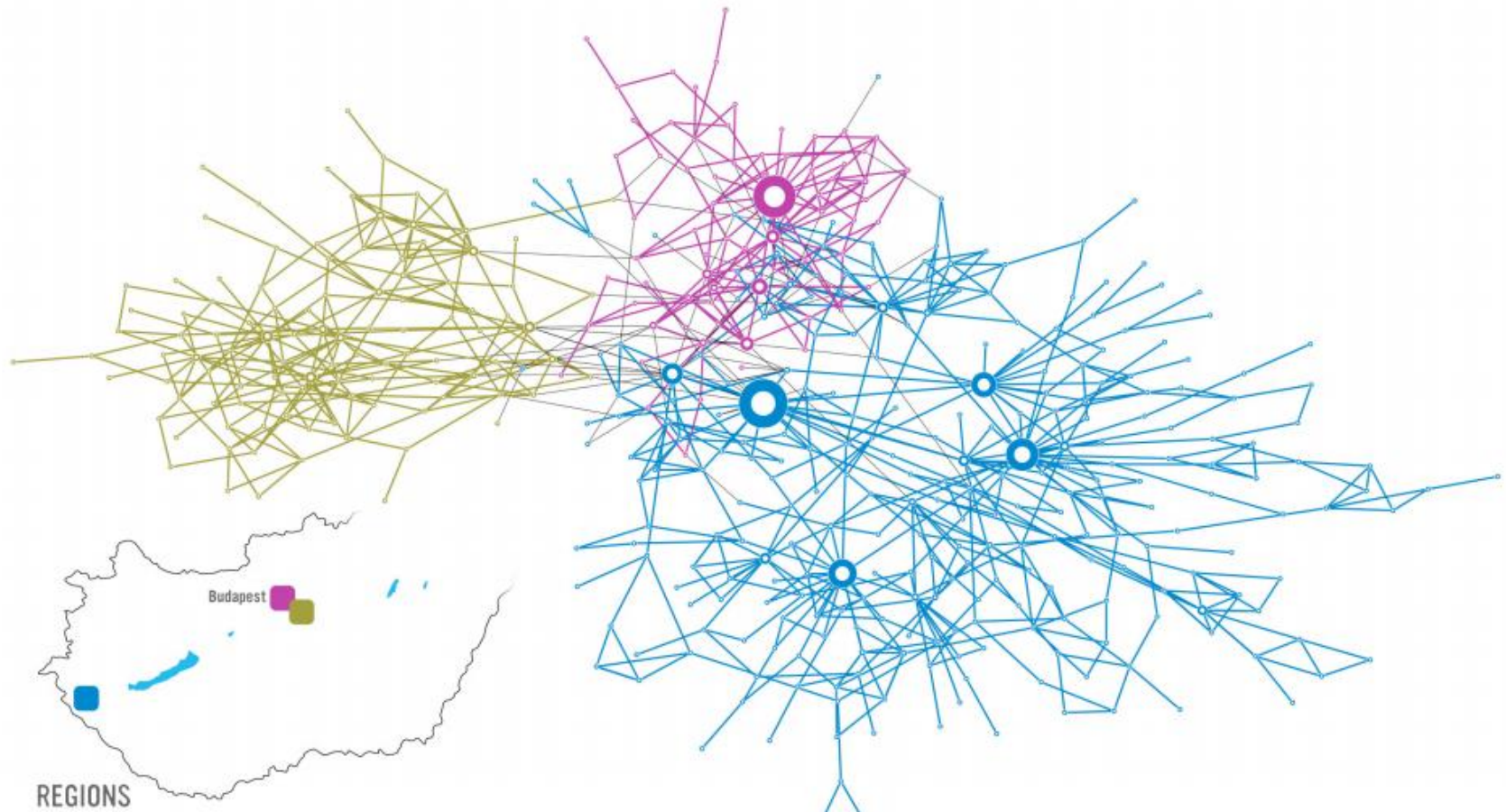
Why network science

- gene interaction networks
- disease spreading
- balancing load in power grids
- brain connections
- **software dependency networks**
- social networks
- ...

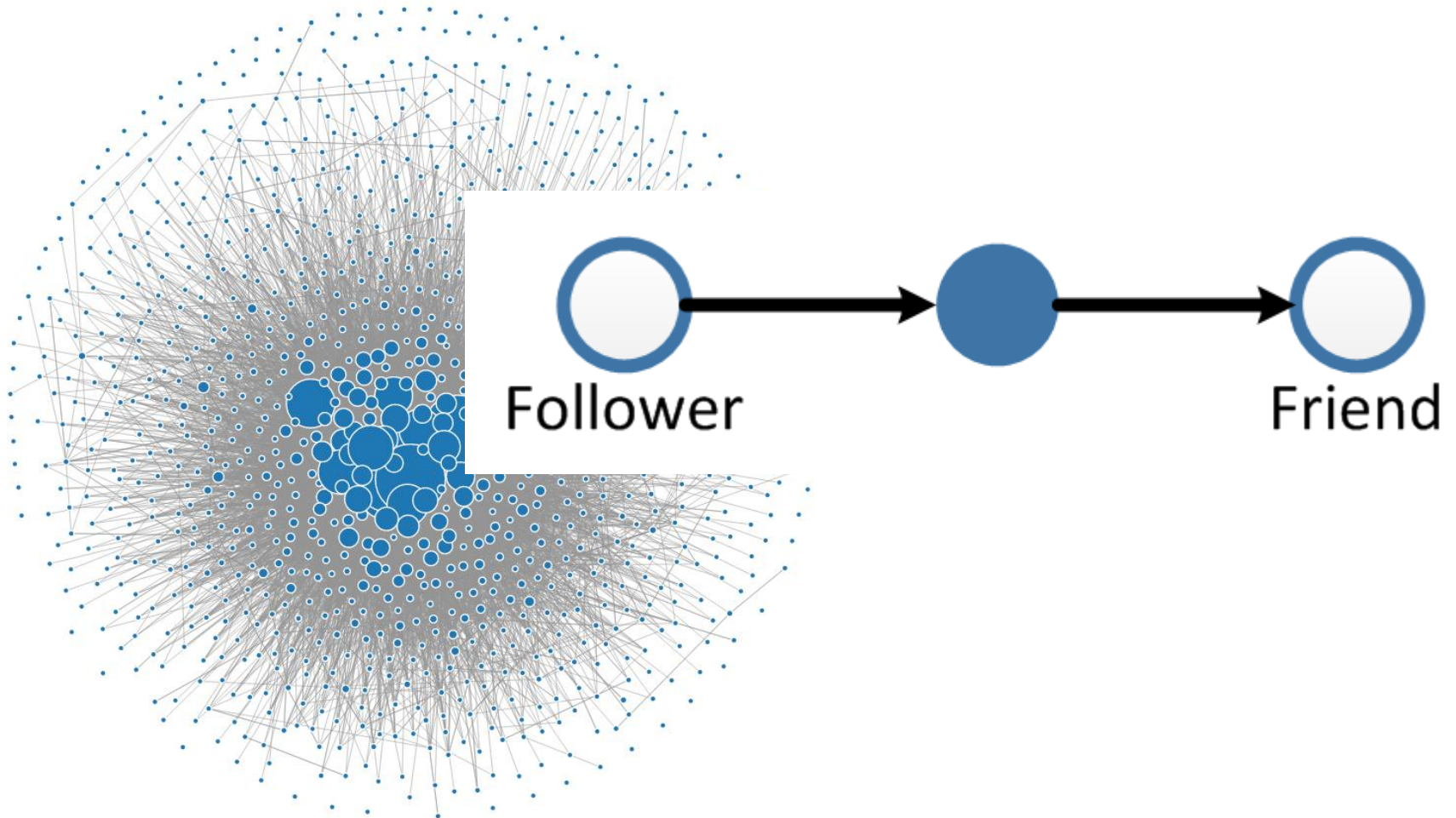
Karate club network



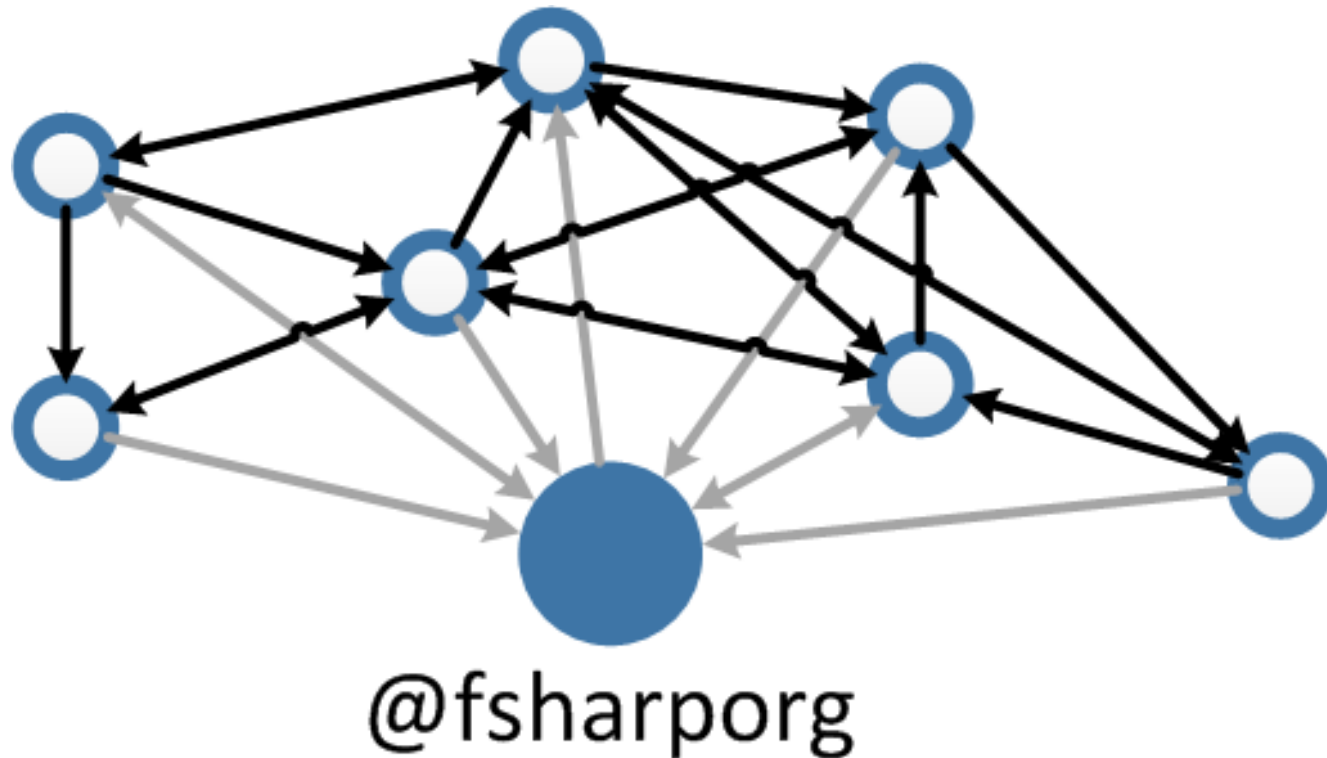
Insights from social networks



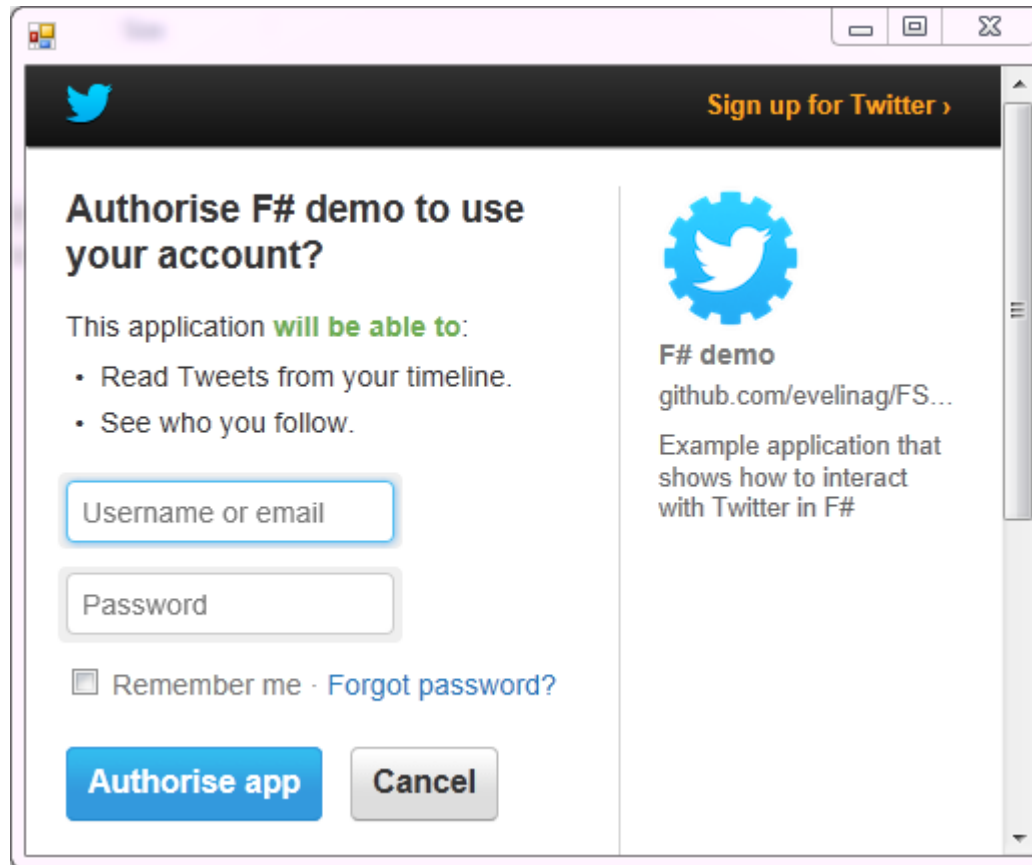
Twitter network



How large is your ego?



Connecting to twitter



A screenshot of a web browser window showing the Twitter authorization page for an application named "F# demo". The window has a standard macOS-style title bar with minimize, maximize, and close buttons. The page header features the Twitter logo and a link to "Sign up for Twitter". The main heading asks the user to "Authorise F# demo to use your account?". Below this, it states "This application will be able to:" followed by a list of permissions: "Read Tweets from your timeline." and "See who you follow.". There are input fields for "Username or email" and "Password", a "Remember me" checkbox, and a link for "Forgot password?". At the bottom are "Authorise app" and "Cancel" buttons. On the right side, there is a blue gear icon with a white Twitter bird, the app name "F# demo", its GitHub repository "github.com/evelinag/FS...", and a description: "Example application that shows how to interact with Twitter in F#".

Sign up for Twitter ›

Authorise F# demo to use your account?

This application **will be able to**:

- Read Tweets from your timeline.
- See who you follow.

Username or email

Password

☐ Remember me · [Forgot password?](#)

Authorise app Cancel



F# demo
github.com/evelinag/FS...
Example application that shows how to interact with Twitter in F#

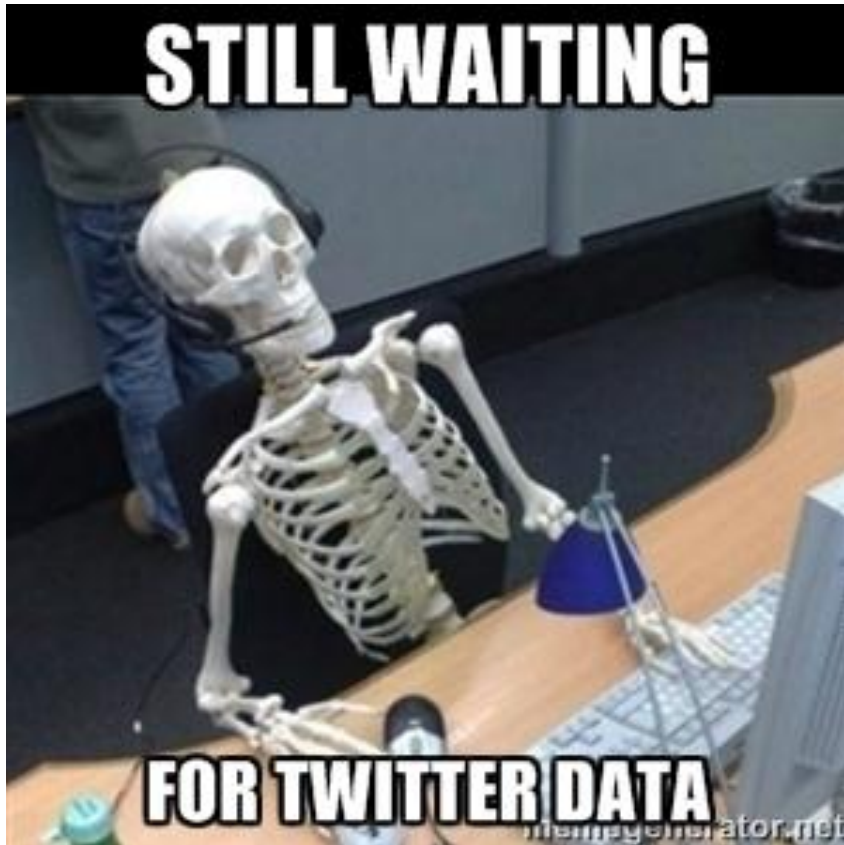


Interactions on Twitter

Are numbers of
Retweets and **Favorites**
correlated?



Downloading data

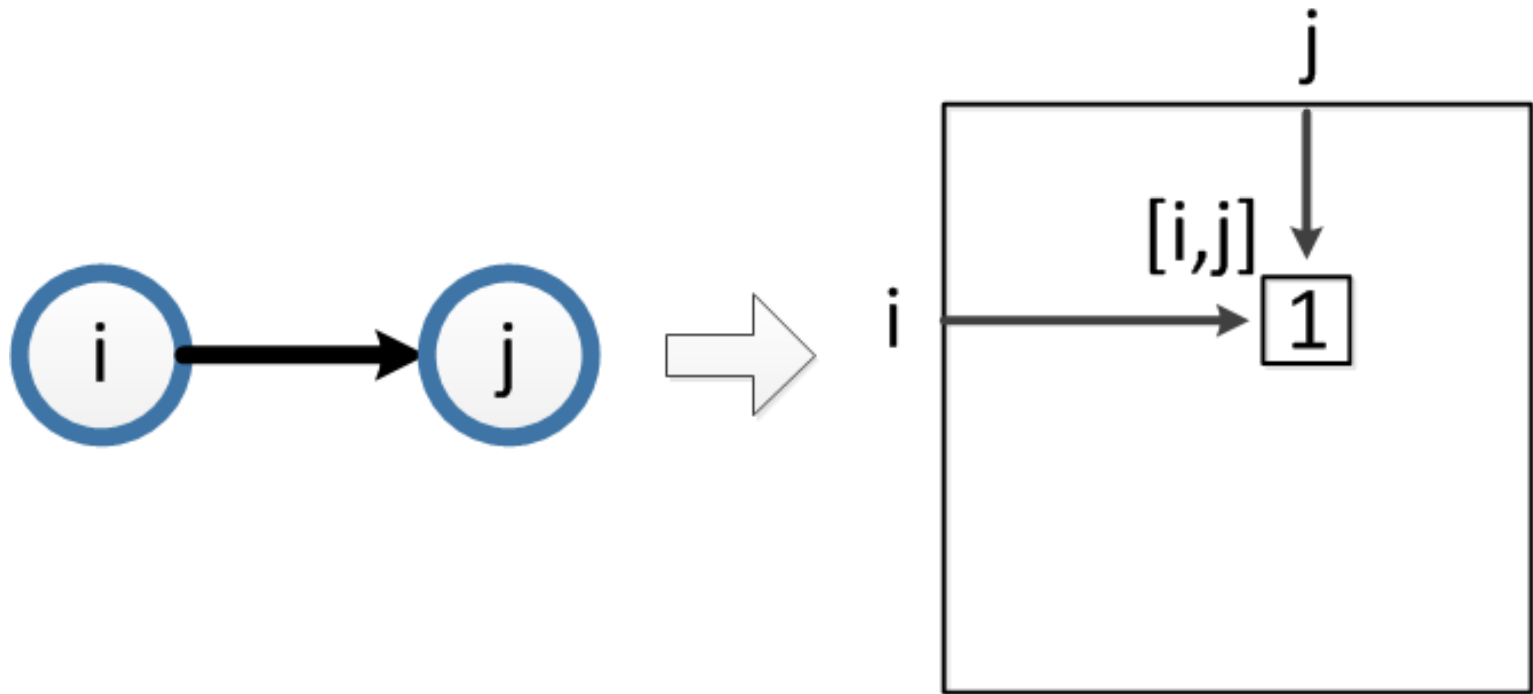


- 1) List of nodes
- 2) Connections between nodes

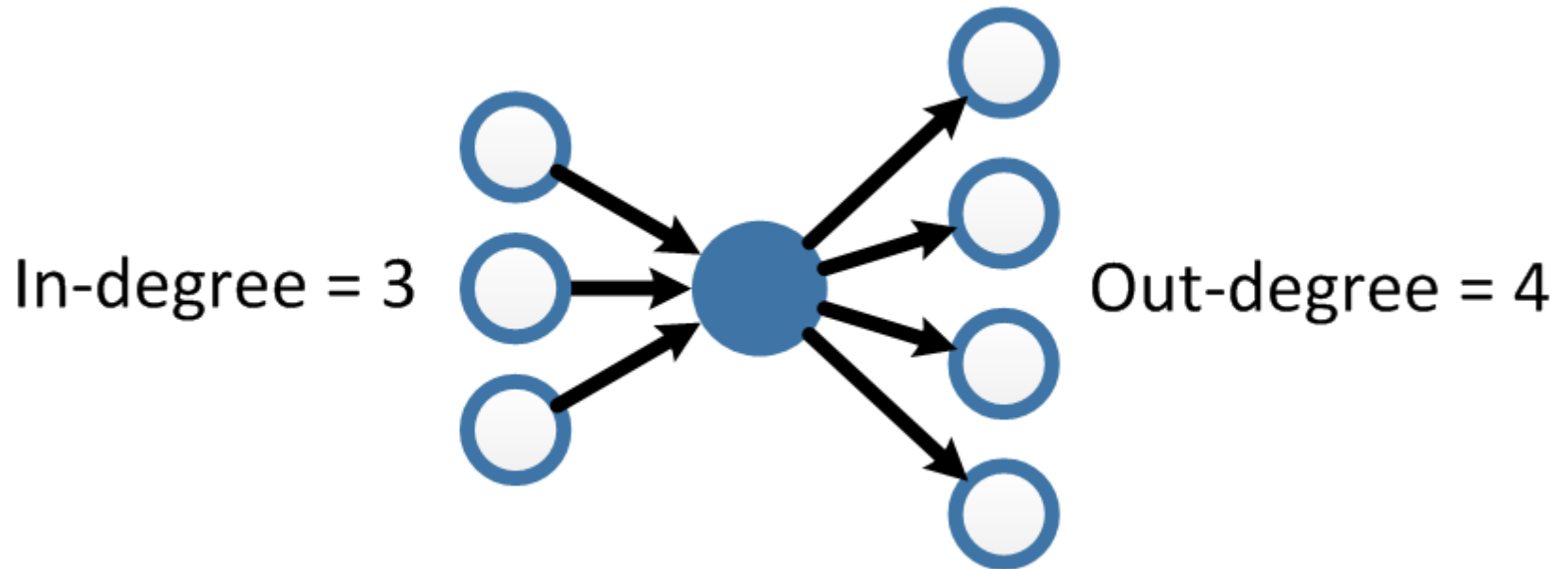
Twitter API allows only 15 requests every 15 minutes to list connections.



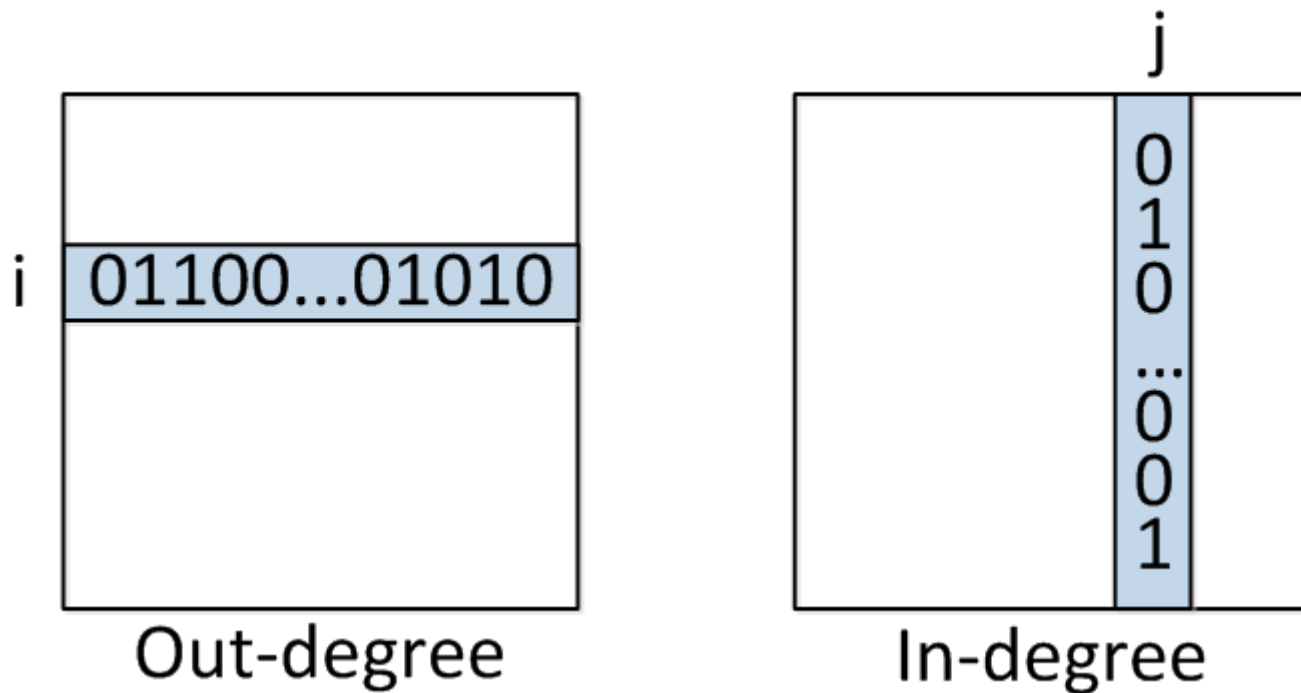
Adjacency matrix



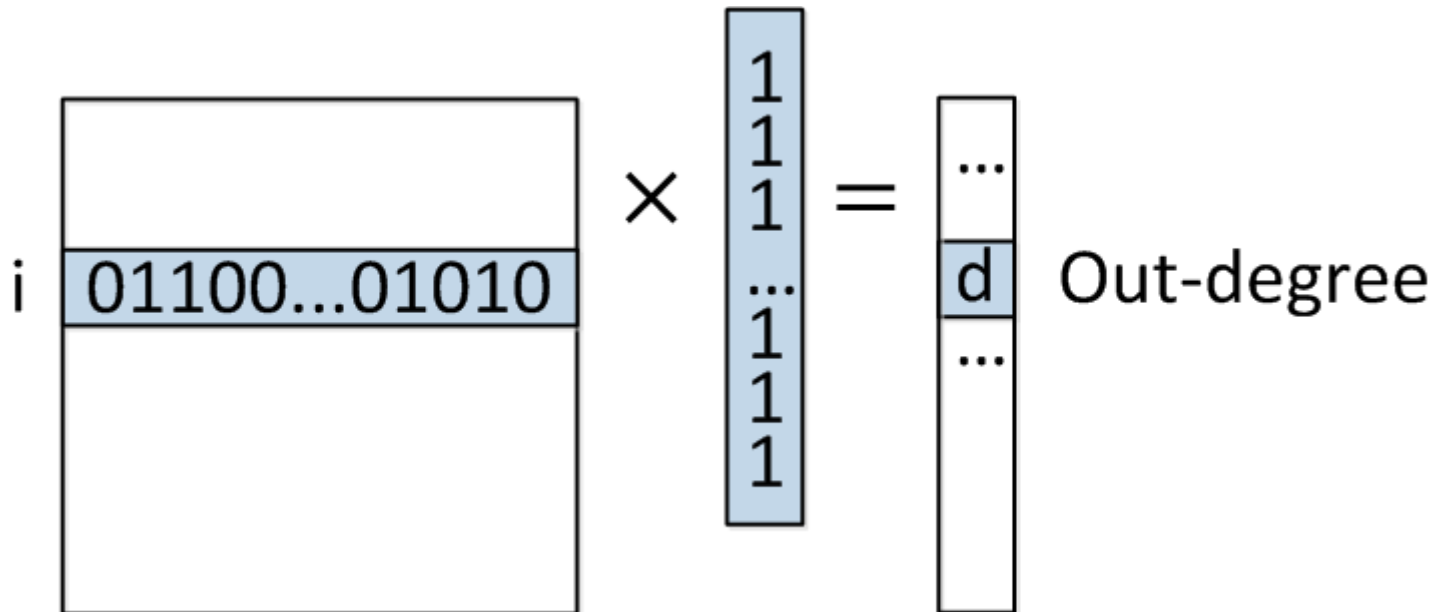
Degrees



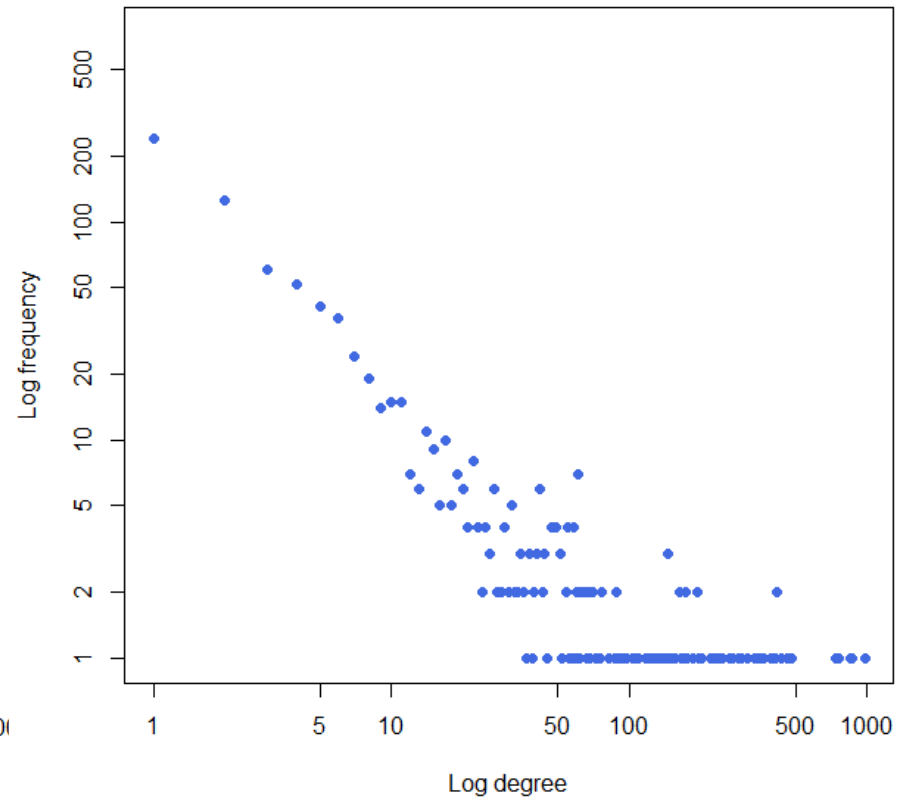
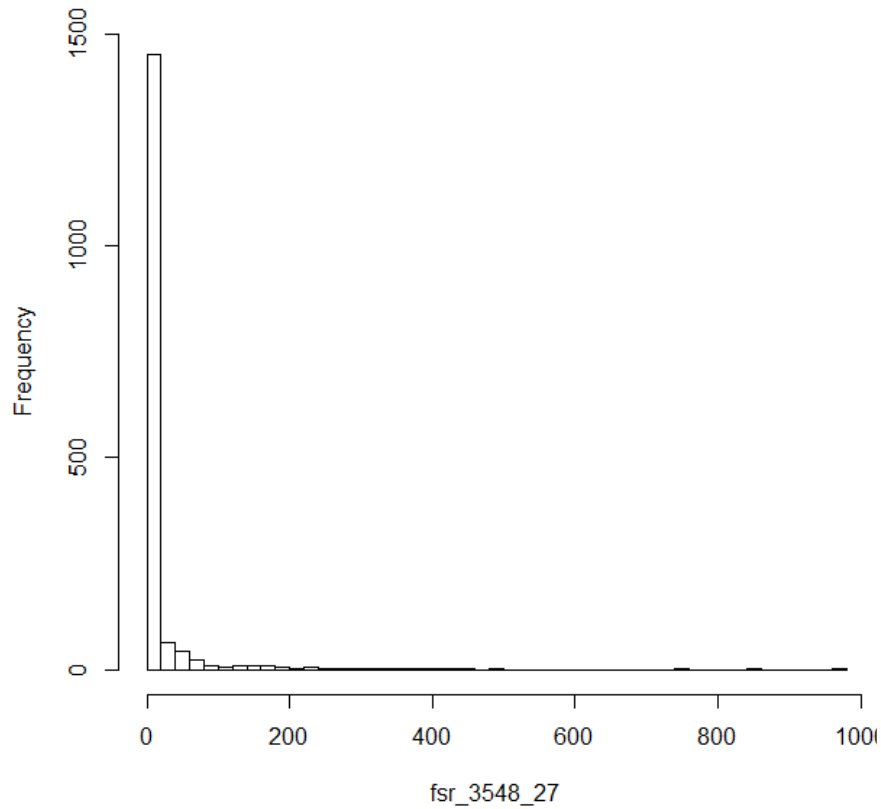
Degrees



Degrees



Degree distribution

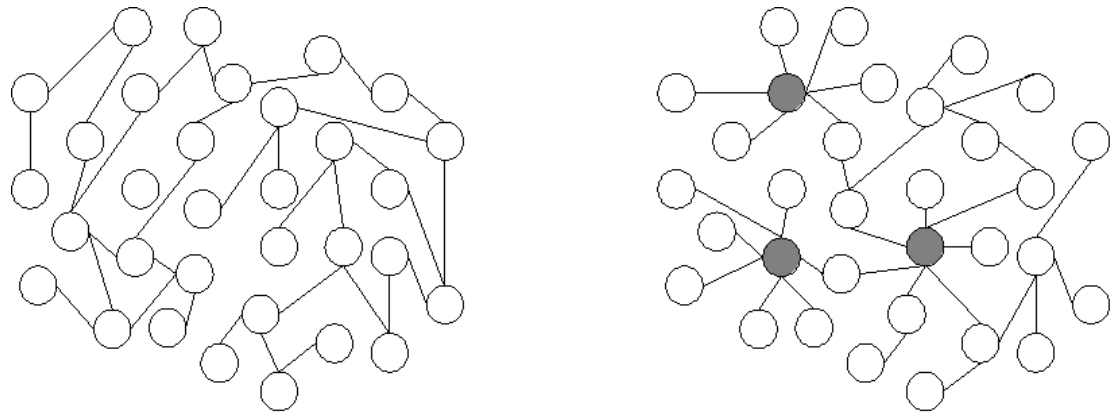


Scale-free networks

- Power law

$$P(d) \sim d^{-\gamma}$$

- Networks growing over time with preferential attachment
- Hubs
- Robustness



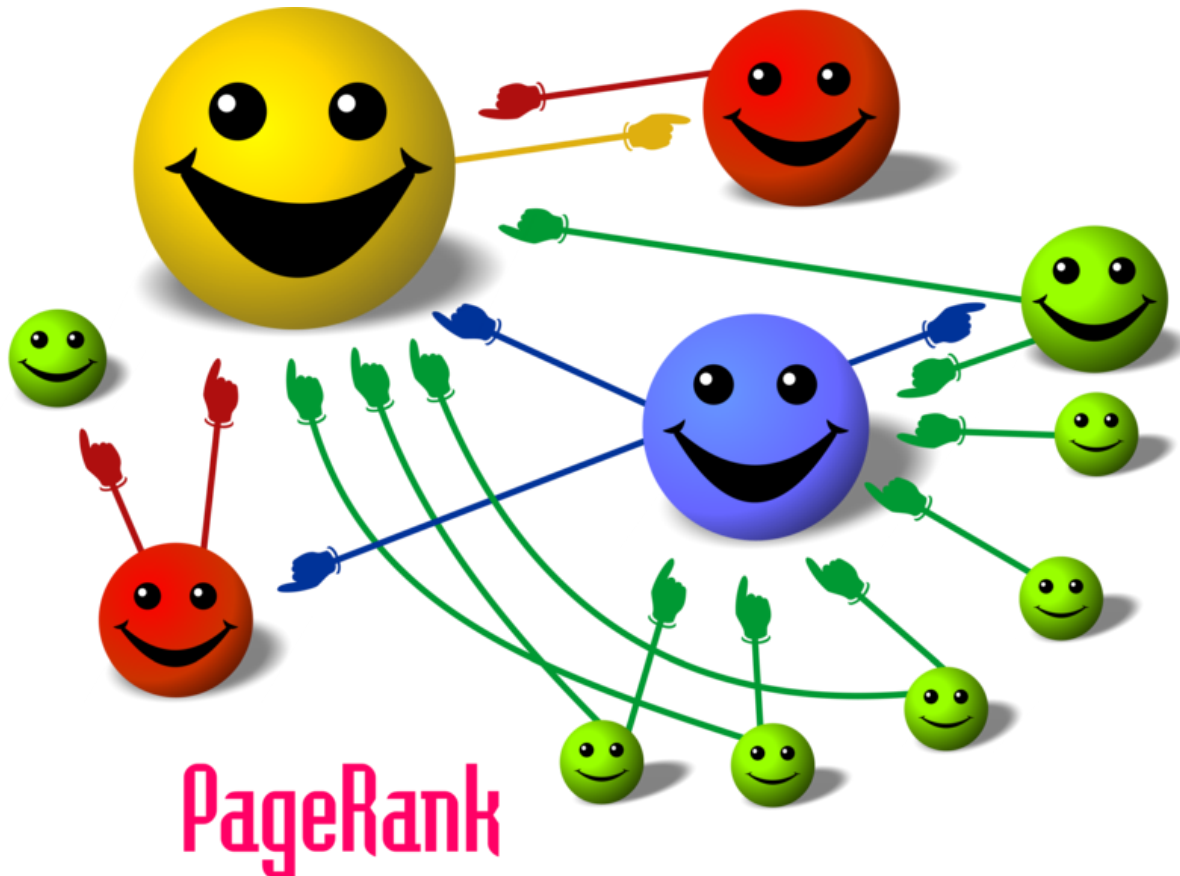
- Your friends have more friends than you have.

Hubs in networks

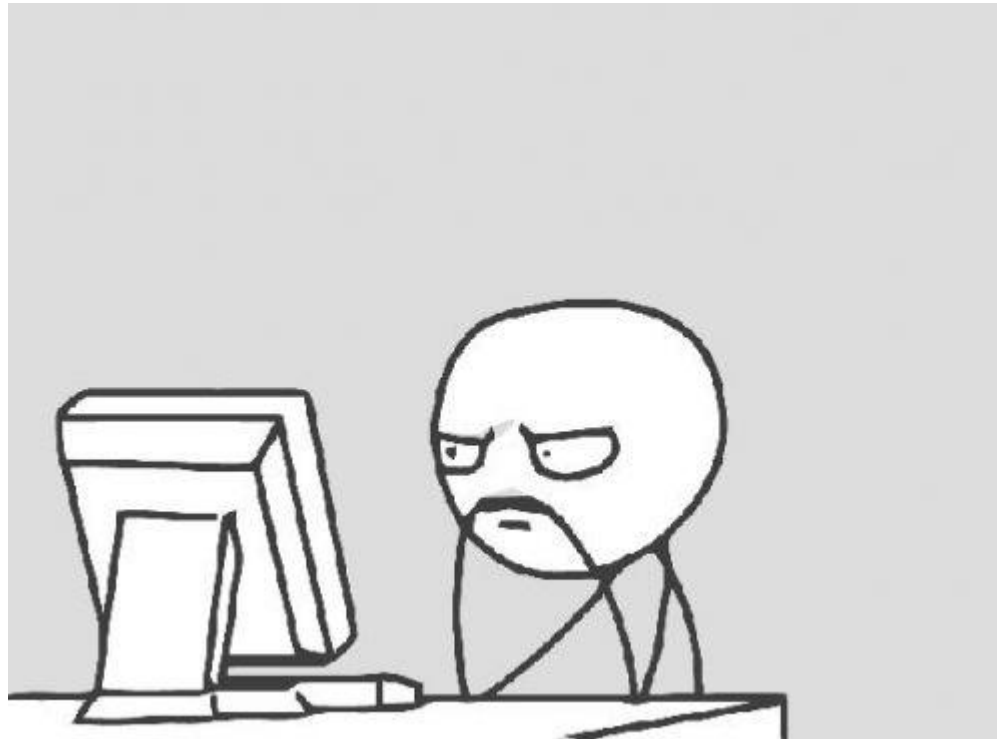
How to identify most
important nodes in a network?

Centrality with PageRank

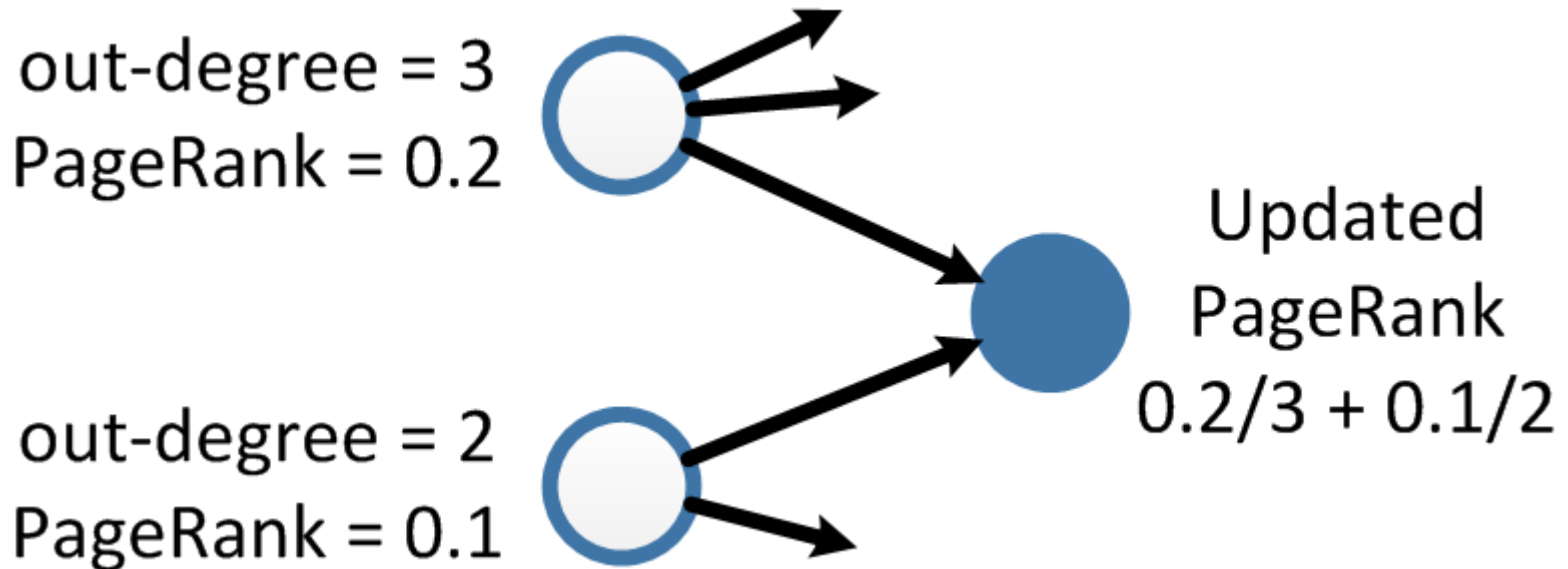
Your followers are not created equal.



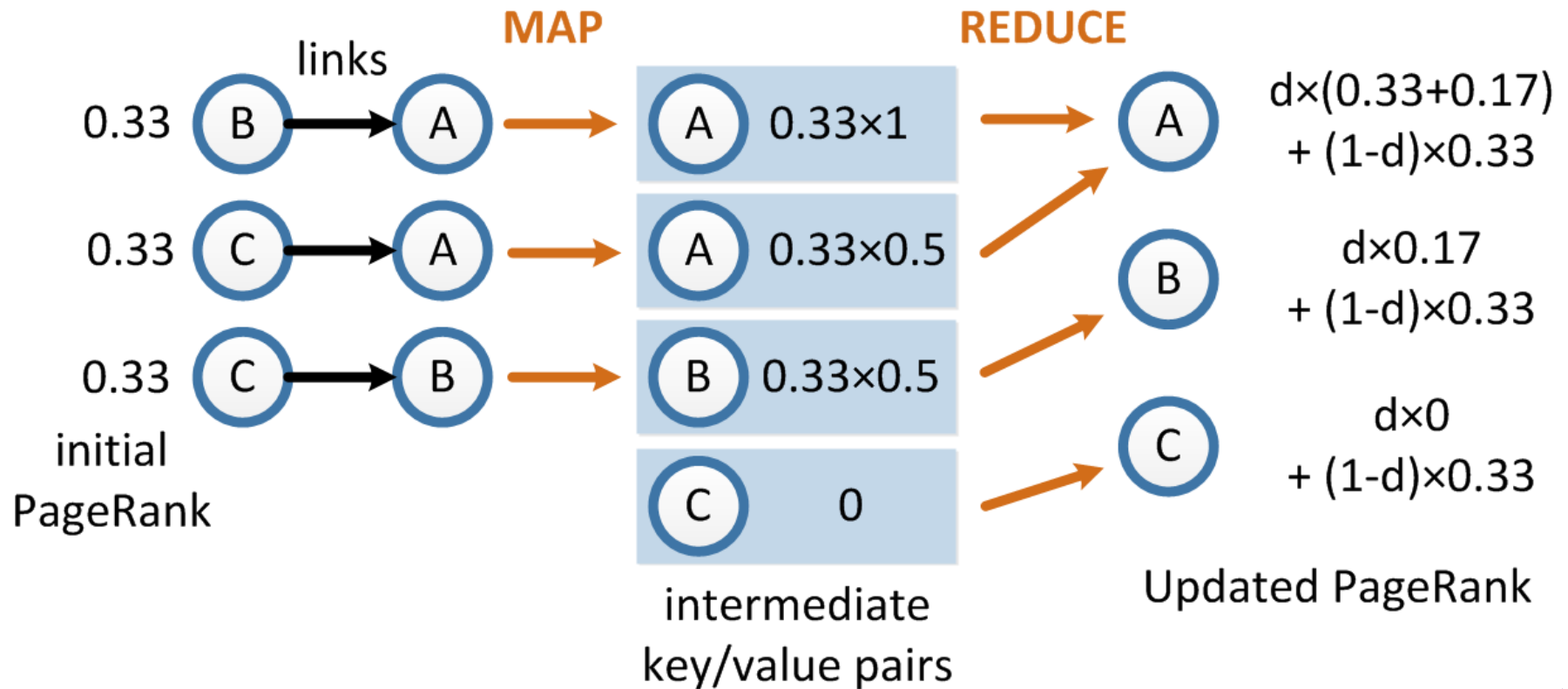
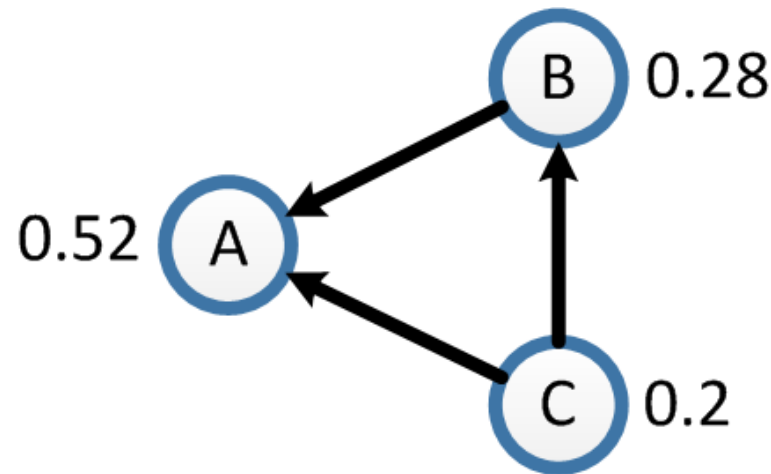
Random surfer model



Centrality with PageRank



+ random jumps



PageRank changes

February

1. migueldeicaza (0.033130)
2. dsyme (0.032783)
3. tomaspetricek (0.027756)
4. LincolnAtkinson (0.021993)
5. VisualFSharp (0.020233)
6. c4fsharp (0.019720)
7. rickasaurus (0.019189)
8. ptrelford (0.018099)
9. 1tgr (0.016525)
10. sforkmann (0.014970)

September

1. dsyme (0.028640)
2. migueldeicaza (0.024808)
3. VisualFSharp (0.024479)
4. tomaspetricek (0.021066)
5. c4fsharp (0.019612)
6. rickasaurus (0.014272)
7. sforkmann (0.013471)
8. 1tgr (0.012768)
9. ptrelford (0.012669)
10. FSPowerTools (0.012113)

PageRank changes

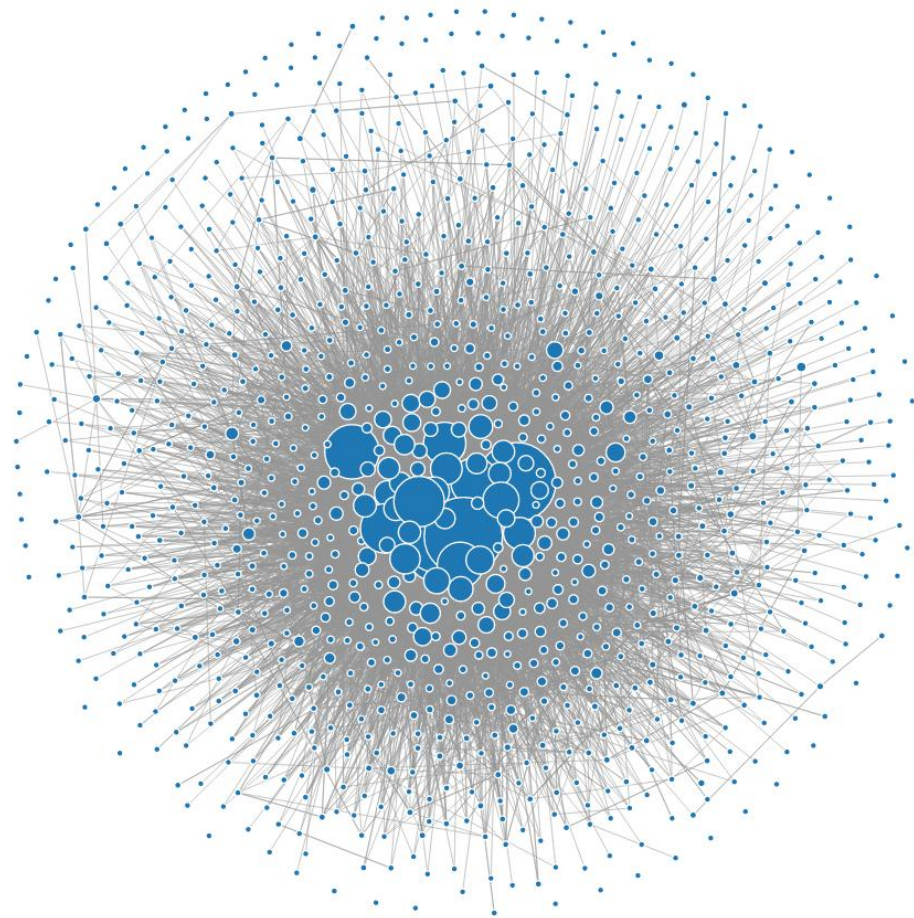
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Visualization with D3.js



Go play
with data!

Thank you

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fsharp.org

F# eXchange 2015

17 April, London

