

Networks and Population Dynamics

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The Internet

- Degree of nodes follows “power law”
 - See faloutsos,faloutsos&faloutsos
- Origins of this are not obvious
 - Preferential attachment usually involked
 - Aka rich-get-richer
- close analysis suggests ≥ 9 root causes
 - The origin of power laws in Internet topologies revisited
 - 10.1109/INFCOM.2002.1019306

But networks also shrink

- Fixed telephone net
 - s/POTS/skype/
 - s/usenet news/twitter/
- But also “overlays”
 - s/altavista/google/
 - s/myspace/facebook//
 - s/sms/whatsapp/
 - s/e-mail/IM/

Why do people leave a net?

- So dynamics of joining somewhat understood
- But what about leaving
- Is it because noise exceeds signal
 - Spam in email (>95% in cambridge)
 - Adverts in web (>80% in mobile)
 - Trolling in social media (10-50%)

So can we do empirical study

- Of the population dynamics of technologies
- Could apply to transportation networks too
 - Horse->car-self drive
- And to novel currencies/payment tech
 - Cash->credit card->contactless->blockchain
- Not just diseases 😊

Conclusions

- Network economics are interesting
 - Technology networks change fast
 - Math/model common
 - Now have much more empirical data
 - Crunch the models on the data!
- Build a predictor for next success, e.g.
 - Recommending Investors for Crowdfunding Projects, 10.1145/2566486.2568005
 - <http://researchswinger.org/publications/an14recommending.pdf>