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 involved
  – 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